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ABSTRACT

This report investigates how technologies such as computers, multimedia, and telecommunications can be effective tools for English-as-a-Second-Language (ESL) instruction. Both ESL and non-ESL teachers are coming to view these technologies as a means by which ESL learners who cannot otherwise participate in class activities can be actively involved in language and literacy practice. A recent survey indicates that ESL teachers are effectively using software designed for native speakers of English--software that is academic, is content-rich and, when their use is coordinated with mainstream academic content, helps to support the interplay of linguistic and conceptual development. This report discusses the unique features of electronic texts, provides analysis of learner interactions with them, and discusses the implications for second language and literacy development. Examples are drawn from extended observations of two exemplary ESL classrooms (one elementary, one middle school). Carefully crafted teacher use of electronic texts demonstrates the real and potential roles of this medium, for computers break down and obsolesce and can sometimes be too cumbersome to deal with, reaffirming the primacy of the human dimension of instruction. Overall, this report surveys and documents the very innovative use of cutting edge information and communications technologies in ESL education. (Contains 47 references.) (Author/KFT)

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CELA RESEARCH REPORT

ELECTRONIC TEXT AND ENGLISH AS A SECOND LANGUAGE ENVIRONMENTS

CARLA MESKILL
JONATHAN MOSSOP
RICHARD BATES

CELA RESEARCH REPORT NUMBER 12012

NATIONAL RESEARCH CENTER ON

ENGLISH LEARNING & ACHIEVEMENT

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ELECTRONIC TEXT AND ENGLISH AS A SECOND LANGUAGE ENVIRONMENTS

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INTRODUCTION

School-age children for whom English is not the native language have immediate and critical needs regarding English language and literacy. The majority of these children are not in any of the nation's bilingual programs. Thus they are restricted in their participation in academic activity during the period needed for their second language and literacy acquistion, a period which is typically from five to seven years. During this time, English as a Second Language (ESL) learners receive instruction in second language and literacy through specialized English as a second language instruction as well as "incidentally" in regular mainstream classroom classes.

Providing opportunities for ESL learners to develop English language and literacy skills is a continual challenge and concern for schools. Recent interest in technologies[1] as a means of supporting language development has brought ESL teaching professionals around the country to include computers, multimedia, and telecommunications as tools for instruction. In addition to ESL-specific instruction, non-ESL or mainstream teachers are coming to view these technologies as a means by which ESL learners who cannot otherwise participate in class activities can be actively involved in language and literacy practice.

A recent survey of school use of technologies with ESL children indicates that not only are ESL teachers utilizing technologies with their students in a number of ways to support their language and literacy development, but also that the vast majority of software packages they use are designed for native speakers of English. In other words they are academic, content-rich and, when their use is coordinated with mainstream academic content, they help to simultaneously support the interplay of linguistic and conceptual development. Reporting teachers also state that use of content-area software promotes student involvement and consequent skills development in content-based language and literacy. In short, electronic texts are apparently being used, and used well and thoughtfully, by many ESL professionals (Meskill & Mossop 1997).

This report discusses the unique features of electronic texts[2], provides analysis of learner interactions with them, and discusses the implications for second language and literacy development. Examples drawn from extended observations in two exemplary ESL classrooms (one elementary and one middle school) where computers are used as tools to support ESL instructional activities are provided to illustrate the nature and dynamic of second language learner literacy skills development as they occur in interactions with electronic texts.

GOALS AND PROCESSES OF K-8 ESL INSTRUCTION

The goal of ESL instruction in grades K-8 is to provide linguistic, cognitive, and affective support to learners as they catch up with, and proceed through their grade-level curricula. It is the ESL experience and support a child receives, then, that serves as the primary locus of a mentored initiation into the immediate discourse communities of school (Freeman & Freeman 1994). Much of that experience and support is consequently centered on the development of literacy and the language that constitutes and mediates literacy in an academic environment. Because this support must be tailored to widely differing needs, backgrounds, and levels of ability, it takes on many forms but consistently focuses on the language, literacy, and concepts of the academic subjects the ESL students are studying.

The ESL professional's major concern is to design and implement activities that guide learners to attend to the linguistic forms and meaning of content. At the same time they encourage the development of appropriate linguistic and cognitive strategies for understanding and production. A balanced focus on form and meaning is particularly critical for this population (Long 1991; Ellis 1995; Spada & Lightbown 1993) as methods of analysis and the meanings derived from instructional materials depend a great deal on what learners bring to the process in terms of background, experiences, beliefs, and the ways of the native language they already speak. Ways of knowing and talking in ESL instructional contexts simultaneously validate the wealth of linguistic and cultural knowledge and experiences children bring to school, and work to weave these into academically appropriate ways of knowing and expressing. In this respect, the 'textwork' that ESL focuses on is far more complex than the 'comprehension myth' of learning:

simply recognizing and comprehending words does not constitute reading or transacting with text for academic purposes.

As with reading in one's native language, developing the transactional expertise needed for effective and critical understanding entails much more than superficial word recognition. A cognitive and experiential complex activates and interacts with what one reads and interprets. Particularly relevant to second language readers is the role of vocabulary, an aspect of language that represents a crucial dimension for participation in the second language environment. Recent conceptualization of the nature of word knowledge recognizes the continuum on which the notion of 'knowing' a vocabulary word fluctuates. At one end of the continuum knowing a word means simple recognition; at the other, a depth of understanding permits one to use the item productively and well. The process of moving from one end of this theoretical continuum to another entails a long process of encounter with, and use of, words and their meanings in both aural and textual forms. It is up to the ESL professional to discover, make connections, and cultivate ways of knowing that capitalize on what learners bring in conjunction with new ways of knowing and transacting with text. Effective 'textwork', then, is activity that 1) combines focus on form and meaning; 2) scaffolds learner understanding dialogically; 3) encourages melding old and new ways of knowing; and 4) ultimately brings learners to participate in the literate community surrounding them.

In tandem with textwork comes meaningful interaction in the target language at the levels of linguistic, literacy, and cognitive development. In terms of linguistic development in a second language, a number of hypotheses have been proposed that point to the importance of conversational interaction in the language acquisition process. Long's (1985) negotiated input hypothesis states that the interactional modifications people make as they negotiate meaning and solve communication problems provides the kind of input learners need to develop their communicative competence. Swain (1985) proposes the comprehensible output hypothesis, which also focuses on negotiation of meaning. In this view, learners of another language should be encouraged to communicate because it is when they experience difficulties communicating that they search for precision or alternative linguistic means of expression. Thus, they are "pushed" into rendering their output more coherent. Besides the claims of benefits to speakers, negotiation is also believed to facilitate comprehension. Pica, Young, and Doughty (1987)

empirically demonstrated that negotiated input results in higher comprehension than either unmodified or simplified input. Finally, Peck (1978) suggests that in interactive discourse, learners have the chance to practice syntactic constructions and provide scaffolding for each other. Taken together, these studies strongly suggest that negotiation of meaning has an important role to play in the development of a second language (Savignon 1991).

We will discuss at length our observations of 'textwork' being supported in unique ways through the thoughtful integration of electronic texts in ESL instruction and the powerful forms of literacy-oriented discourse and activity that ensue.

ELECTRONIC TEXTS

Electronic texts (e-texts), by virtue of their unique characteristics, play a potentially powerful role in school-based ESL contexts and can be viewed as a good venue for literacy activities in K-8 classrooms. They can also serve as rich contexts for the active negotiation of meaning by students in need of this kind of linguistic/cognitive engagement.

E-texts consist of on-screen information (visual, textual, and aural) within computer, multimedia, and/or telecommunications environments. They are what people from all walks of life, especially school-age children, are becoming accustomed to encountering, reading, manipulating, and producing as part of daily activity. They include games, databases, talking books, hypermedia and telecommunications. E-texts are becoming widely used by contemporary school-aged students as a matter of course for both deliberate and incidental instruction and they offer several features that can, when deliberately exploited for instructional purposes, enhance learning across grades and subjects.

E-texts have features and accompanying capabilities that are qualitatively different from what has traditionally served as our primary tool for literacy activity – the print medium (Barker 1996; Papert 1993; Ulmer 1989; Winkelmann 1995). The attributes of e-texts differ from those of print in many significant ways. For example, where print is *permanently static*, electronic texts are *dynamic, malleable* and *manipulable* (Winkelmann 1995). Where print is typically *hierarchical*, electronic texts are *anarchic*, with forms that are instantaneously changeable (Ulmer 1989). As a

result both the experience of the reader and the environment itself are subject to a form of lawlessness. This is in direct contrast to experiences with traditional Western forms of expository print which is most often written within a strict, closed, linear form. This anarchic aspect of electronic texts shapes roles and discourse around e-text activity.

Where print is physically *self-contained* and *restrictive*, e-texts are *hypertextual*, *decentralized*, and *democratizing* (Winkelmann 1995). E-texts are typically linked to a variety of information in a variety of forms. Meaning is not restricted to a single, closed set of words on a self-contained page. E-texts, particularly in the public settings of classrooms and laboratories, are also open to viewing and, by extension, to critique and commentary. Democracy gets played out in the context of interactions around the medium.

The unique features of e-texts lead to a type of literacy activity that is qualitatively different from the reading of print. The malleability of words and screens place the "reader" in a position of power in which she can move in a variety of directions at any given moment. The visual and functional nature of this activity is not reading but "e-texting" – a term that will be used here to describe computer-based activity whereby an "e-texter" interacts with written and visual information on the screen. This activity, while not completely unlike print reading, represents expanded and unique opportunities for working with language. It includes the essential characteristic of the "psycholinguistic guessing game" (Goodman 1967) in both text form as well as in visual (pictorial) texts, to which Arnheim (1988) expands Goodman's definition. E-texting, then, involves reasoning with both the aural/written word and visual information and this engages cognitive processes that are viewed not only as parallel, but also as interworking systems of understanding.

The widely differing literacy practices, experiences, and text orientations of various cultures have often been cited as a serious source of difficulty for those learning and adapting to a second language, culture, and the accompanying literacy practices. In the U.S. in particular, cracking the code of tightly structured hierarchical print forms used in schools and the workplace are particularly problematic for individuals whose life experiences do not necessarily include apprenticeship to these forms (Cummins & Sayers 1994; Heath 1983; Parry 1996). The permeable, quasi-structure of e-texts represents unique opportunities for their readers to 'read' by enabling them to align their existing experiences with the ordering and independent management

of what they see on screen. Freed from the physically locked, culturally dense domain of print craft, those of differing orientations can tailor their experiences with electronic texts as they wish, thus exercising their flexible stance toward varied forms of representation.

This individual volition exerted on the form and meaning of electronic texts may be both a liberating factor and one that ultimately expands children's skills and abilities as readers (Meskill, Mossop & Bates 1998). The trend in language acquisition studies is to view learning language as a process that involves the analytic and holistic, with the former called into the service of the latter. This shift parallels a broader postmodern conception that moves away from the analytic as preeminent and has evolved as a result of reconceptualizations from diverse disciplines. In terms of language learning, three of the most influential paradigmatic shifts have been 1) advances in first language acquisition research that clearly demonstrates that from birth, humans are endowed with a highly sophisticated biological apparatus for learning language that gets triggered by direct experience in the world (Chomsky 1968); 2) humanistic trends in education that recognize and value the crucial role of affect in language and learning (Curran 1976); 3) postmodern valuing of cognition that extends well beyond traditional Western ratio-analytic modes of human thought (Ulmer 1989). The merger of the analytic with the holistic, with the former subordinated to the latter, is nowhere better exemplified than in e-text – an environment that invites free form creativity, experimentation, bricolage, and discovery.

The differences between print and e-texts are summarized below in Table 1.

Print	E-texts
static	dynamic, malleable
private activity	public activity
hierarchical	anarchic
self-contained	hyper, decentralized
linear	non-linear
whole	fragmentary
restrictive	democratizing
illustrative	mixed media

Table 1: The differences between print and e-texts.

In the ESL context, e-texts are being used widely and thoughtfully in schools (Meskill & Mossop 1997). This report examines particular features of e-text that may be especially valuable for second language and literacy development and documents how these play a role in unique discourse and literacy activity in the classroom.

METHODOLOGY

The guiding question for the design and implementation of this study was the following.

> **What specific features of the e-text environment appear to support language and literacy development in a second language?**

Of the more than one hundred ESL teachers who identified themselves as having model applications of technologies with their students (Meskill & Mossop 1997) two were selected to have their instructional contexts be the focus of this phase of our investigation. Both teach in the same district. Criteria for selection included exit rates of ESL children in the district, length of time a technologies component had been in place, and teachers' training and expertise in both instructional technology and as an ESL professional.

Observations, teacher interviews, student interviews, and interviews with district administrators took place in selected contexts over the course of a two-year period. The elementary context involves an ESL pull-out approach that utilizes technologies during pull-out time. The second context, a middle school ESL classroom, has children scheduled for daily ESL classes. This technology-rich classroom is also a popular drop-in site for children seeking additional help with their coursework during their free periods and after school.

A total of 20 sessions were videotaped, transcribed, and coded using the qualitative research utility NUD*IST. Two sets of codes were iteratively developed: 1) unique features of electronic texts (see Appendix A); and 2) optimal conditions for language learning in instructional contexts (Appendix B). The starting point we employed for unique features of e-texts were those described by Ulmer (1989) and Winklemann (1995). Through the constructive, iterative processes of independent coding, comparison and negotiation, we came to include additional features we were seeing come into play in the two contexts we were studying. Optimal conditions for learning in the second language classroom were adapted from Johnson (1995) – a composite of conditions that have emerged from second language theoretical and empirical work over the last ten years. The coded data were subjected to an intersection search (e-text feature(s) + condition(s)). Intersections are defined as instances of discourse and action where e-text features play a key role in the instructional discourse and where coders saw at the same time optimal

conditions for second language learning reflected in the same talk and action. From these intersections, it became clear that certain features of e-texts do in fact co-occur with conditions that promote successful language learning. (See appendix C for sample intersections.) Rather than present only isolated examples of coding intersections, we then chose three representative sessions of three different levels (early elementary, late elementary and middle school) for intensive descriptive analysis in narrative form. The goal of the analysis is to detail the complex interplay of e-texts with language and literacy activity that is characteristic of these instructional environments.

Our two participating teachers were also asked to engage in stimulated recall or what we call "video talkback" using the videotaped sessions of their teaching with e-texts. As they viewed videotapes of their classrooms, they were asked to comment on their practices, the role the medium was playing in their decision-making processes, and how they perceived activity as supporting the language and literacy development of their students.

Teachers and students – both ESL and mainstream – and district staff and administrators were also interviewed. Prompts and questions used in the interviews probed these stakeholders' perceptions of the ESL and e-text interface. Interviews were also transcribed and coded by broad topics (see Appendix D).

THE CONTEXT

ESL practices are deeply conjoined with a myriad of contextual, affective, societal, familial, and political influences. First and foremost is the valuing of the ESL child, her language and cultural heritage and the richness of the contributions her uniqueness brings to the local community. This is an essential stance both within the direct (district/building) and the wider community. Where these elements are not philosophically aligned with the needs and goals of non-native speakers as a whole, instruction risks being reductionist and impoverished, serving more to disenfranchise than to embrace and nurture the ESL learner and her family. When instruction is undertaken within supportive local contexts, the ethos of the sociocultural context can be highly supportive of the language and literacy development process (Reyes 1992).

The Indian River Central School District[3] is located in rural northern New York State and abuts the U.S. Army's Fort Drum. The district is comprised of five elementary schools (grades K-4), a middle school (grades 5-8), and a high school (grades 9-12). Approximately 3,100 students attend Indian River schools. With the expansion of Fort Drum to accommodate the 10th Mountain Division in 1985, the district now provides public education to the children of military families as well as children residing with the rural families that the district has traditionally served. Since 1985, the portion of the student body coming from the military has steadily grown and now makes up well over half of the student body. However, due to the nature of military service, the student population from military families is highly transient. Families typically remain in the Indian River district for as long as the military heads of household are stationed at Fort Drum – usually three years. Also, given that children in military families tend to be young in age, the five elementary schools are those most affected by the special challenges of educating a mobile student population.

One such challenge is meeting the immediate needs of children learning English as a second language. Prior to 1985, the Indian River school district did not have an ESL program. Now there are five New York State certified ESL teachers employed – three at the elementary level and one each at the middle school and the high school. The heritage languages of students served in this district's ESL classrooms represent a rich diversity of cultures. They include Spanish, German, Korean, Tagalog, Hawaiian, Samoan, French, and Japanese. The ESL program serves approximately 225 students each year.

The Indian River ESL program provides ample support for its students. Its first and most important task is the immediate identification and assessment of new ESL students. Typically children whose first language is other than English are children of military fathers who have wed overseas. Some parents who wish to have their children quickly assimilate into the American mainstream may be reluctant to identify their children as ESL learners. Another issue is that these children may have already begun their education at schools without ESL programs. Some of these children have also been identified as learning disabled, reading disabled, or speech impaired.

From our observations it is evident that the Indian River ESL program has a unique commitment to its students. First, and apparent from the focus of our study, learners in the ESL

program are supported by a range of technology resources (computers, printers, scanners, digital cameras, camcorders). The ESL teachers themselves are knowledgeable technology users who have received training supported by district procured grant sources. The ESL teachers in turn regularly provide support for mainstream classroom teachers who are beginning to use technology as tools for instruction. Their mainstream classroom teacher colleagues professionally respect the ESL teachers. In tandem with collaborating with others around technology, these teachers strive to foster continuity between the efforts of the mainstream classroom and the ESL program in terms of curriculum, instruction, and student assessment.

At the district level, both the integration of technology in the classroom and the local population of ESL children and their families are highly valued. Both are seen as enriching the district at all levels. At the level of funding, the district offices have been very proactive in obtaining state grants to support technology integration in general and technology integration for ESL in particular. These monies are used not only for the purchase of equipment for labs, libraries, and classroom clusters, but for in-service training workshops and a district instructional technology curriculum specialist as well. Unlike many other school districts that view technology as a route to uniformity and consistency across curricula and grade levels, this district is casting technology in the role of catalyst for teacher reflection, creativity, and change. It is seen as a tool to instill pride and a sense of empowerment for teachers, an attitudinal stance that is clearly trickling down to the children as we will see in the next section.

Kathy Moran has both Bachelor's and Master's degrees in Elementary Education (with concentrations in French and Educational Computing). Between 1971 and 1990 she taught elementary grades 1-3 in both New York and Arizona. Since 1991 she has been teaching ESOL[4] (K-4) in the Indian River Central School District.

Martie Menzel has a Bachelor's degree in French and a Master's degree in Elementary Education. Prior to relocating to the Indian River District, she taught ten years at the 5th grade level. When she found there were no openings at the elementary level, she obtained accreditation in ESL through Syracuse University. She has taught for the district at the elementary and middle school levels for eight years.

The ESOL program enjoys a unique position in the Indian River School District. Both the non-native speaking students and the technology are valued and both Kathy and Martie have

strong backgrounds in both ESL and technology. Above all, however, the pull-out classes that form the basis for our analysis are small (2-4 students). This allows a type of continuous personal interaction between teachers and students that would be impossible under larger class size conditions. Thus, our aim is less to present these classes as blueprints for emulation than to portray them as examples of successful technology integration within one specific context.

LANGUAGE-TEACHING EPISTEMOLOGIES

Both Kathy and Martie have training in second language acquisition studies and generally keep up with trends in the field. Their District encourages and supports this ongoing professional growth and reflection. The District Administration encourages teachers to "constantly revisit the research out there and see how they can make it apply" (District Superintendent). We found through numerous discussions with these practitioners that their reflections on the foundations upon which their teaching practices are shaped are closely aligned with popular theory in second language teaching and learning. Not only does their practice reflect these solid foundations, but they are also very clear in articulating key issues in the field and their applicability to their own students and professional contexts.

BICS/CALP

In 1980 Jim Cummins introduced a critical notion to the field of K-12 second language teaching pedagogy. His was a widely applicable and well applauded distinction between the kinds of *social* language that children appear to pick up quite quickly and easily, or Basic Interpersonal Communication Skills (BICS), and the more cognitively challenging language skills associated with higher order thinking and abstraction known as Cognitive Academic Language Proficiency (CALP). While children who are second language learners appear to converse with ease, their ability to think, read, and write in an academic realm may be quite limited; this is especially true if the child is from a semi-lingual population that has no native

language CALP on which to build his English academic skills. This is a fundamental concept behind the practices of Kathy and Martie. It is why their focus on textwork, wordwork and higher order thinking and problem solving is focal and intensive.

> That's one of the problems that the ESOL students have . . . it effects their reading comprehension because they know a lot of the common words but words that you acquire from reading a great deal, they just don't have those more academic type words. So I think that [computer technology] challenges them more . . . to throw those words out to them and keep using them so that they do become part of their vocabulary. (Martie)

The surface oral fluency that ESL children may demonstrate is deceiving. Their sociocollaborative chatter around the computer would lead one to assume that they have mastered the intricacies of the English language. However, their CALP – their ability to use and understand academic English in conjunction with higher order thinking and abstraction – is what drives the initiation processes orchestrated by Martie and Kathy.

Language through Content

An optimal condition for second language development in instructional settings is content richness or, in the case of an academic environment, content and cross-curricular relevance. Because ESL children must simultaneously master both the language and the academic content it conveys, ESL professionals design and orchestrate tasks that can be characterized as a "language through content" or "sheltered English" approach to instruction (Krashen 1985; Edelsky 1996; Mohan 1986). Such tasks require children to interact with, and produce and respond to, language that is situated locally in the work of their mainstream classes. Work in the ESL classroom, then, is characterized as having dual parallel objectives.

> I have congruency forms where I ask the classroom teachers to tell me what areas I could help the children in, or what themes, topics they are going to be studying in the up-coming month, and what skills I could help the children with. (Kathy)

In the case of Martie, the middle school teacher, not only does she design for these two parallel objectives, but she integrates a third: the teaching of higher order thinking skills:

> Well after I pick my language objective I always try to put a content objective for every lesson because I only have them for one period a day. If I only focused on language, I would lose a lot because you can teach the language with the content...Every lesson has both a language objective and a content objective and then we also list a higher level thinking strategy we want to work on too . . . And I try even serving on the committees too so I know what's going on and I'm there and I'm not a stand alone. Our program (ESOL) doesn't stand alone, it's all connected with all the grade levels.

Foci on particular academic content in these ESL contexts is systematic. These professionals work closely with their students' mainstream teachers to keep current with what their learners are doing and with what they need in the way of vocabulary, concepts, and language skills. Work done in the ESL context, then, is consistently tied to the larger content area curricula and serves as the substance through which language and literacy skills are practiced and developed.

Integrated Skills

A key tenet in the field of second language teaching and learning is the notion of integrated skills. No longer are the skills of listening, speaking, reading, and writing treated as separate, autonomous skills, but are viewed as highly integral to one another (Johnson 1995; Savignon 1991). As such, language instructional activity involves children exercising all four skills simultaneously. At the district level, administrators, too, are keenly aware of the value of the integrated skills approach in general, and for language learners in particular. They view the computer as an ideal venue to exercise language using all four skills in immediate and meaningful ways. Likewise, the New York State Language Arts Standards (1998) consistently emphasize the mastery of all four skills and suggest these receive balanced attention in school curricula and classroom processes. The ongoing stream of participatory literacy activity in these ESL environments bespeaks teachers' adherence to this fundamental principle and serves as an exemplary model of language and literacy skills integration.

> It (using the computer for letter recognition) goes hand in hand with reading. Reading, writing, spelling, listening, and speaking, they just all go together and I try to work on all of those areas. (Kathy)

This is echoed by the district's assistant superintendent, who emphasizes the richly motivational contexts computer-supported work can contribute to the simultaneous honing of reading, writing, listening, and speaking: "To hear these kids talk, see them listen, read, and write – the computer creates a superior context for that and it means something."

Negotiation of Meaning as Venue for Acquisition

Current views (e.g. Long 1985; Swain 1985; Pica 1987; Johnson 1995) of optimal second language acquisition contexts see the active negotiation of meaning through motivated interaction with others as the main enterprise of the learning process. It is the active *use* of the target language that serves as a primary locus for linguistic and conceptual development. The teachers in our study are very clear about their adherence to the notion of motivated conversation.

> In ESL, one of the basic philosophies is the more the students are talking, the more they're learning. So, there should be a lot more student talk than teacher talk. . . . I try to get them talking as much as I can, and not only just to me, but then to involve the other ones. . . . I'll often ask "Can anyone else help him first?" . . . [I]t's very easy for the teacher to give the answer. But they aren't learning the language as much that way, and they become dependent on that. (Martie)

Both teachers see the computer as a rich venue and stimulus for meaning-based acquisition. The tight alignment of textual, aural, and pictorial representations in conjunction with teacher scaffolded meaning making comprise an ideal context in which learners can come to exercise and own content words and concepts. As Kathy relates when asked about the ways children make meaning around the computer:

> I think especially because they're so excited about playing the game *Oregon Trail*. I think they will now know what 'occupation' means. I don't think they'll ever forget. Whenever they see the word 'occupation' I think it will take them right back to where they first really understood the meaning and got to choose an occupation.

Awareness of Form

Current views of second language learning (e.g. Ellis 1995; Lightbown & Spada 1993; Johnson 1995) also advocate a balanced emphasis on form and meaning. It is not sufficient for learners to be engaged in meaningful interaction; their attention must be drawn to and awareness cued in to the forms the language takes in the process (Schmidt 1990). The Indian River ESL teachers were quite clear on the role that attention to form plays in their teaching in general, and with the computer screen representing and mediating forms in particular.

> I'm also trying to reinforce some grammar in this lesson with comparing slower, slowest, . . . so I keep repeating just as a model so that they can hear whether it's slowest or slower. (Martie in a video talkback)

With careful teacher orchestration, the 'immersion in meaning' quality to these computer-based activities are effectively punctuated by attention drawn to the forms of words, sentences, and texts representing the focus and substance of talk and action. Our observations reveal a great deal of talk and activity punctuated by something we've come to call 'point talk' where what is being spoken about is pointed to on the screen with either the mouse or the index finger. As such, learner attention is continually drawn to various forms of language and the visual objects and actions these represent.

Challenge

One of the optimal conditions for language learning in an instructional context is that learners be challenged by materials and activities that are just beyond their current level of ability (Johnson 1995; Krashen 1982). Driving Kathy and Martie's moment-by-moment decision-making processes is their continual judging of teachable opportunities in light of an individual student's current level of ability. As such, they are maintaining and continually making adjustments to an internal syllabus of sorts for each of their learners. This is attested to in several of the teachers' comments regarding their instructional decision making.

> That's one of the theories, the ESL theories, it's called i + 1. You always try to go beyond what they already can do so that you are challenging them to grow faster. They don't have a lot of time. You really have to push them to learn the language. You don't have time to spend a lot of time at one level, you just keep pushing them as far as you can. (Martie)

Valuing the Native Language and Culture

In addition to valuing each learner's individual qualities and experiences and working to integrate these into the ongoing instructional stream, the ESL teachers value children's native language and recognize the fact that cognitive growth in and through that language is critical to their overall development as literate thinkers. The first language is viewed as the linguistic and conceptual link that teachers and learners make use of; learners bring strengths and skills from their other language and cultural heritage. Teachers value this bilingualism and biliteracy as an important asset.

> I have another [software program], *Sticky Bear Reading*, which my first graders use and that [has] the option to go into Spanish too, . . . often times the Spanish speakers will choose that. They don't want to forget their native languages. And that's a perfect opportunity for them to become literate in Spanish. With the first graders, they may never have seen these words written in Spanish before and [I] think that's great when they want to see what the printed word looks like in Spanish. (Kathy)

In addition to conducting ESL "pullout" sessions with their students, these teachers are also actively involved in "push-in" activities whereby they accompany their students in their mainstream classes to provide support and assistance as needed. Pushing in also affords them opportunities to monitor their learners' progress and needs and gives them a chance to keep up with the mainstream curriculum. In both cases, the ESL teacher is seen as a powerful asset in the mainstream classes. They are viewed as experts in much more than English as a second language:

> I push in to their programs (mainstream classes) to enrich anything that has to do with multiculturalism. They'll ask me could you come in and explain certain holidays or certain activities that go on around the world, that type of thing. (Martie)

To further integrate and encourage the heritage language, parents and other relatives are frequently invited to work around the computer with the children using both English and the native language.

> We invite the parents in the Fall, and the parents come in and they are partners with their children for that period; and then in the springtime I like to arrange a special time for parents to come back. . . . that time the parents work one on one with their children on the computer. They can construct stories in their native language and they are excited about it. (Kathy)

E-Text in Action: Three Narratives

In the following section, we present three narratives that serve as detailed illustrations of these teachers and their students at work with e-texts. The first is a sample of grade 2 students using the *Once Upon a Time* software package; the second a 4th grade class using *Oregon Trail*; the final narrative is from the 8th grade using a program called *Widget Workshop*.

Once Upon A Time

Once Upon A Time is authoring software with which students can write a story based on a particular theme. There is a range of environments to choose from, items that can be placed into the environment, and a space for writing. When a student selects an item, she hears the word "spoken" and then decides whether to include it and its accompanying picture in her story. In this way students construct a story to accompany a sequence of pictures that they create.

Kathy's room is small and narrow with six computers arranged along the two longer walls. Despite the restricted space, the room is bright and attractively decorated with students' work. Juana, a Spanish speaker, and Chang, a Korean speaker, are paired at a computer where they are working to create a story about a farm. Chang is an experienced user of the program and Kathy has purposely put him with Juana so that he will be able to show her how to use it, and to do it in "kid talk." Kathy also feels that Juana has something to offer Chang since she speaks more English at home and has a better grasp of word order:

> Chang speaks Korean when he goes home. He speaks Korean and English. Juana doesn't speak much Spanish at home. So she hears more English than Chang does and I think her word order in English, in her spoken English, would be a better model than Chang's is. So, I think he could help her learn to use the program. But she could help with the word order.

While Kathy is happy with Chang's ability, she feels that Juana is behind the group in terms of reading ability. She scored at the 11th percentile on the Stanford Reading Comprehension Test. She hopes that by having Juana write and then read back her own work her skills may improve:

> She's a quiet little gal, but she doesn't have the ability to read as well as her peers in her classroom, as well as the peers in the ESL group with Chang and Alicia. Her writing seems to be stronger than her reading, and so if I can give her an opportunity to see words printed correctly she can model those and also to help her fix any errors she has in her written work it will help her when she reads it back, to see it written correctly, without errors. So, I don't consider her an advanced student yet for that reason, because, [she doesn't have] . . . that total picture, that listening, speaking, reading, writing.

Kathy has chosen a farm topic for this class as a result of the congruency forms she regularly distributes to the mainstream teachers, in which she asks them for up-coming themes and for skills with which the non-native English speaking students need help. Having been a regular 2nd grade teacher for five years she said she knows the curriculum well. Her objective for this unit (which took place over several class periods) was to work with the students to write a simple text with correct punctuation and with a number of sentences going together to make up a paragraph.

Kathy believes that computers are very helpful to her in achieving these goals. Programs like *Once Upon A Time* provide an array of flexible vocabulary features that connect print, sound, and graphic in ways that she believes can help improve reading ability:

> Well, I think with the vocabulary word portion of this computer program, she has a listing of maybe 40 or 50 vocabulary words. And she can click on a word and it will be pronounced for her, and then if she chose . . . she would have to type in those letters exactly, and then the picture would appear. So if it were a horse, maybe she could read the word horse, but still she would have to type in h-o-r-s-e in order to get the horse, to be able to manipulate that animal. And if she did not know how to read that word, she could click on it and it would be read for her, so she could hear the spoken word. She would have a chance to spell, type the spoken word, and then manipulate that animal and then construct a sentence where she could put that word in the sentence. So I think that will help her improve her reading skills.

Kathy also believes that computer tasks can provide something unique (or at least something that is difficult to provide ordinarily) in that they create an environment where the students are motivated towards the achievement of products they can take pride in. This motivation inspires the whole pattern of interaction:

> What we're seeing right now on video, had they been in their classroom, they easily could have just been sitting and listening and not interacting, not saying anything. They could easily be overlooked in a classroom just by being quiet, well-behaved children. I think in here, the dialog that we have, the learning, the pride of learning to do something new, accomplishing something, I think that was a beneficial half-hour for all of us. . . rather than giving the children a blank piece of paper and saying "Okay, I want you to write a story, or draw some pictures and then write a story about it," being the well-behaved, polite, children that they are, you know, I'm sure they would have done what I asked, because that was a task that I had assigned. But with a computer it just opened up a world. Juana was able to choose the background, first of all, that she wanted. And then choose vocabulary words, and the pictures, she had the option to erase, delete some of the pictures she had chosen if she didn't want to use them.

The classroom sequence we videotaped and analyzed is characterized by an alternating sequence of teacher-student and student-student interactions as Kathy moves around the room helping different dyads on computer. She organizes her dyads so that the students have clear roles to play when she is absent and this provides a structure in which problem solving becomes a cooperative venture despite the fact that one student has control of the computer and the story being generated. What follows is a detailed account of the first half-hour of the farm unit.

Kathy begins by introducing the activity to Juana and Chang and enlists Chang's help as "teacher" while she circulates to other groups in the room. Chang immediately begins to take on the role of instructor as he issues a series of short directives:

Chang:	Click on it.
Juana:	What?
Chang:	Background. Right there. Yeah, click on it. Hold it. See it goes on the farm. Back up to there. If you want pictures just push this.

These directives are accompanied by much pointing to the screen. The gestures provide visual support for Juana and Chang's negotiation of meaning. What is also notable is that Juana retains her control over what finally happens on screen by keeping her hand on the mouse. This forces

Chang to use language rather than demonstrate by taking control of the computer. With Chang's guidance, Juana brings up a farm background on the screen.

Kathy returns and helps the dyad find an animal to place into the farm background. Her first concern is that Chang might be rushing Juana through the screen options without giving her a chance to understand them. She asks Chang how the computer might be able to help with unfamiliar words and then suggests that Juana give it a try. Juana clicks on the word "bull," which she does not understand and Kathy carefully takes her through the steps of typing the letters and clicking on them for a picture of a bull to appear.

Kathy:	Just one second. Let's take a look at that bull first of all. What would you say a bull is?
Chang:	It's like a dog, but it just gots horns.
Juana:	It's like a cow.
Kathy:	It is like a cow. Do you think it's a boy or a girl?
Chang:	Girl.
Juana:	Boy.
Kathy:	Well let's see. If it's a girl. What gives milk?
Both:	Cow.
Kathy:	A cow. And a cow would be a girl. This would be a boy. B for boy, B for bull. Here we have a bull. Would you like a bull in your story Juana?
Juana:	Dog.
Kathy:	Would you like a bull in your story?
Juana:	No.

In this exchange we see Kathy adopting a scaffolding approach to questioning. While she knows the answers to her own questions, she does not evaluate but instead uses Juana's answers to scaffold further questions. Furthermore, while she has assumed control of the interaction she has not taken control of the topic. She ends the sequence with a genuinely dialogic question to which Juana answers "no." After a considerable amount of time spent on the word "bull," Juana decides that she wants a dog rather than a bull in her story.

Kathy walks away to another group and Chang now tells Juana how to color her dog. He suggests brown but Juana insists she wants a black dog. Again we see Juana emphasizing her ownership over the story.

Kathy comes back and discusses the positioning and size of the dog. Chang takes the mouse to show how to position the dog and Kathy questions him so that what he did can become clearer to Juana.

Kathy:	How do you think you'd move that dog over there?
Chang:	Like this. [Chang moves the cursor with the mouse.]
Kathy:	What did you do Chang?
Chang:	I clicked on the dog.
Kathy:	And then what did you do to make it move? What did you do with your hand?
Chang:	I touched the dog and I was moving the mouse.
Kathy:	Could you move the dog Juana? Let's see you move that.

Juana positions her dog but is unhappy with the size.

Chang:	Click it shrink.
Kathy:	What does shrink mean?
Chang:	It's going to get smaller.
Juana:	Oh, yeah.
Kathy:	Is that a good size?
Juana:	Yeah.
Kathy:	Do you want any more dogs in your picture?
Juana:	No.

Kathy immediately picks up the unfamiliar word "shrink" and again uses Chang to explain the meaning to Juana before handing back topic control to her.

The next time Kathy is away, Chang tells Juana how to put flowers into the picture and then how to color them. When Kathy returns she introduces the writing activity. First she instructs Juana directly about how to get a vocabulary list from the program and it is quite clear that Juana has difficulty reading the words.

Kathy:	Can you read some of the words?
Juana:	Nope.
Kathy:	I'll bet you can.

Juana: Sleep, sleep.

Kathy: It looks like "sleep," but it's a sheep. That's an animal on the farm isn't it?

Juana: Uh huh.

Kathy: First letter?

Juana: S S

Kathy: You can just continue with the first letter then honey.

Juana: Sun, T. Tree. Is that truck?

Kathy: Yes it is a truck. Click on it and see. [Juana clicks. Computer says "truck"] You're right.

Juana: My dad has a white truck and a white car.

Kathy: You might want to put a truck in your picture.

Here we see a student on the verge of literacy, sounding out letters and trying to get meaning. When a familiar word (truck) appears, Kathy accepts the apparently off-task comment of Juana and suggests that she incorporate it into her story. Then Kathy asks that they work on a sentence while she spends time with another group.

Chang now tells Juana how to begin writing her name and the two students interact around the task of getting Juana's name on the screen.

Chang: Write your name. Hold shift. With the J [points to the keyboard].

Juana: I have to hold shift again?

Chang: No just spell your name. That's the name. U - A.

Juana: I know, I know, I know.

Kathy reappears and helps Juana with her sentence. While the sentence itself is simple, "Juana has a farm," the fact that it is on computer leads to considerable interaction where the context, the words on the screen, the keyboard, and the software provide the reasons to talk.

Juana: I forgot have you erase this thing for F. [points to screen] I forgot to put the space.

Kathy: Okay. You push your left arrow one time [points to keyboard]. Now press the spacebar and you push your right arrow [points to keyboard]. Push it one time. There. Now you can put these in the story. What have you written so far?

Juana: Juana has a farm.

Kathy:	Then you've got the F there. Finish writing farm. Do you know how to spell farm?
Juana:	No.
Kathy:	Look up here [points to screen]. Do you see "farm" written anywhere? Up here? We called your story "Farm" and you are on page one. Can you find the word "farm"?
Juana:	[points to screen] Farm page one.

Again although the discourse is "teacherly" in the sense that Kathy already knows the answers to all the questions she asks, it is has a rich dialogic quality as both the participants are working together to complete the on-screen task. Having the computer as a mediator of the linguistic interaction results in part of the focus being on the mediating tool and less on the correctness of Juana's response.

Several comments can be made about this short sequence of classroom interaction. First of all it is undeniably real. The students have been set a task that involves the manipulation of complex technology and as a result the talk is mostly about how to use it. While the story itself is the locus of relatively abstract language (there is little of the "here and now" quality of language to the topic of writing about a farm in a classroom), the computer screen anchors and brings to life what would otherwise be wholly abstract. It is with the computer as a tool that both the production and comprehension of language become real and meaningful. One feature of any computer software is that there is little room for ambiguity or tolerance of error. To progress to the next step of any program, the preceding one must be completed in a precise way. Kathy uses this feature as an accuracy tool for writing when she has Juana type out unfamiliar words in order to see the graphic equivalent.

In this interaction Juana has been given control of the computer. She is writing her story about a farm and despite her lack of language and computer skills her story idea remains the dominant force in her decision making. She is directed by Chang and instructed and questioned by Kathy but ultimately retains control of her topic. She decides not to take a bull, where to position her dog, what size and what color to make it. Kathy and Chang are both more skilled participants but they respect Juana's ownership over her story. With a computer, what appears on the screen has a publicness that is seldom evident with handwritten text and yet it is also privately controlled. Thus there can be public discussion without conflict of ownership. By

organizing the activity so that Juana had control of both the mouse and the keyboard, Kathy ensured that she would not be relegated to the role of passive observer.

As well as being challenged linguistically, Juana is also challenged communicatively as she is the person controlling what appears on screen. She is obliged to comprehend Chang's and Kathy's messages perfectly as the machine has no tolerance for ambiguity. With a computer task it is not possible for learners to use any of the avoidance strategies that are normally used to mask comprehension failure and lubricate the wheels of conversation. Chang is also challenged, though admittedly to a lesser extent. His role is that of a teacher – to "teach" Juana how to use the program. This is not an easy task as it requires a use of language (directives) that students rarely have an opportunity to employ. Again, with the computer as a mediating tool, he is required to be precise and clear in his expression of meaning. He does, of course, have the use of gesture to anchored referents to aid him and we see this in the constant "points to screen" notes on the transcript.

As is evident in the excerpts above, the discourse between Kathy and her students in this sequence is never completely monologic or dialogic. Kathy never asks "test questions" which are then overtly evaluated and yet she does ask many questions to which she already knows the answers. While there is a surface level of monologism, beneath this there is a rich dialogic structure as all three participants share in the construction of the story. Juana, although she has the least knowledge, is the ultimate arbiter of what is accepted; Chang adopts the role of a proxy teacher; and Kathy uses her power (the power that all teachers have) to prompt the students to express themselves and to scaffold the acquisition of new literacy and computer skills. In this process, the computer screen both brings the topic to life and demands comprehension. It also facilitates both student control and the appropriation of different roles.

Oregon Trail

A 4th grade group of four ESL students are working on the simulation *Oregon Trail*. The students must choose professions and with varying amounts of food and money embark on the

journey from the Midwest to Oregon. Along the way they encounter disease, hunger and the other hardships that were common during the years the trail was used.

Kathy chose this program because it linked with a 4th grade theme about life on the prairie:

> We now are reading one of the Little House on the Prairie books, *On the Banks of Plum Creek*, . . . a trade book from the 4th grade classroom. I chose this one purposely just so they could see what it was like to travel back in this time and to actually meet a family. And I taped an episode from the television, *A Little House on the Prairie* episode two weeks ago. They viewed that in class and they had a chance to meet that particular family and see what the surroundings looked like at that time and the problems they had. Now we're back reading our novel and we're continuing back also with the *Oregon Trail* game. So it all ties right in.

Kathy is very aware that children tend to rush through the program to achieve the end goal, without thinking about options and the implications of their choices. She therefore continuously interacts with the students to slow things down and to encourage them to explore the on-screen information before making decisions.

> Rather than just have them play the game where it's just easy to move and take time out, continue, go hunting, I wanted them to really think about their choices ahead of time and not just click on an occupation and just quickly get into it. I wanted them to take the time to use the help button and read it and understand that there are different advantages that the different occupations have and just to get them more into the reading and the understanding of the entire game.
>
> I just want them to see what is available to them on the screen. Where the computer will keep track of how much food is remaining, what their pace is, the health of everyone just so they get an awareness for the entire part of the screen and not just follow the little red line of the wagon train.

With her 4th grade students, Kathy intervenes not only because she wants them to extend their vocabulary. She also wants them to be more aware of their surroundings:

> To make sure they understand the meaning instead of just moving on because they could have just sat down and started this game right from the beginning and not talked about anything and they still would have traveled the trail. And they might have had the very same outcome, but I think it's just important to see all of the things that are going on in the course of an adventure, a journey, just day to day life instead of just walking around staring at the ground. Just look around and see what's going on around you and how's that going to affect your own situation.

Kathy feels that the computer offers several advantages over text-based lessons. First there is the way in which information can be accessed quickly with explanations of unfamiliar words only a keystroke away "because it's quick, the information's available to them within a second." Any problem with text would be much more disruptive.

> If we're working at a table with books and a child had a question we might have to stop everybody and we'd all have to focus on the one child's problem, but this way they can still hear what's going on with a classmate but continue on with their own journey.

As with the younger students, Kathy finds that when normally quiet children work on computer, they open up and become animated. "Often times these are the children who are real quiet back in the classroom. You wouldn't think that to hear them and see them interact."

Kathy begins by grouping all four students around one computer and asking questions that recall information from a previous lesson on the *Oregon Trail*. She has a map for the students to see where the trail is and she emphasizes that it was a real trail. On the previous occasion, the students had chosen occupations, and she comes back to check that they have all understood what an occupation is.

Kathy: What's that thing called? Occupation, what does that mean?

Her questions, though, go beyond checking for meaning as she asks them why they chose what they did.

Kathy: Was there a special reason why you chose what you chose?
Tyrone: I chose a doctor because he can . . . it helps peoples.

She then moves to helping the students navigate (talk about the software).

Kathy: For your job. It's your job. Okay. And do we push that help button?
Anna: Yeah [points to screen].
Kathy: And what did that do for us?

From here she moves into the simulation (talk inside the software).

Kathy: Something breaks and you'll be a good carpenter.

Anna: Me too.

Kathy: You too? How much money did you start with?

Then she switches out of the simulation to congratulate Bridget on her use of the computer hardware.

Kathy: Gee Bridget I like the way you're using the mouse to show us right where we are. It helps to point so we can track our reading. How about the carpenter?

These excerpts show how Kathy moves fluidly across different types of discourse as she interacts with the students.

Next the students divide into pairs on two computers and begin traveling the trail. One pair soon comes to a river. To make the river crossing more meaningful Kathy has a ruler ready so Anna and Tyrone can measure the depth.

Tyrone: You must cross the river to get (?). The river is 610 feet wide and 2½ feet deep. How high and deep is it?

Kathy: Well let's get a ruler and measure that. [Anna gets the ruler and measures] 2½ feet deep. I would measure it right from the ground. Right from where your feet are. One . . . two . . . and then take that bottom one and go up ½ foot.

Tyrone: ½ foot right there?

Kathy: Okay. So it's about [points to screen] . . . how deep it is.

Tyrone: So we could just walk through it [points to screen].

Anna: Yeah.

Kathy: Let's see how you make out.

Tyrone: Oh my gosh.

Anna: Oh no.

Kathy: Did you make it?

Tyrone: Yeah.

Anna: Yeah. We almost went all the way down.

By now the students have totally entered into the spirit of the simulation and they separate again so that each one can experience the simulation individually. Their language expresses their

excitement and involvement with the program. Tyrone even spontaneously asks a math question in his effort to gauge the extent of the obstacle facing him.

As the students continue on the trail they encounter challenges ranging from snake bites to broken wagons. The students have total control over their discourse as they "live" in the adventure. At times Kathy enters into the spirit and interacts with the students at this level.

Bridget:	Oh Tyrone, you got snake bitten.
Tyrone:	Ouch.
Bridget:	Tyrone got snake bitten.
Kathy:	Hey, I'm curious these are the doctors over here and their health is poor? Somebody drowned? What happened to these doctors?
Anna:	Tyrone and the ox is sick. Tyrone is bitten by a snake.
Tyrone:	Our wagon's delayed. Come on. Come on.
Bridget:	Everybody's good.
Kathy:	Oh boy. Good going carpenter.

At others she steps back to control the flow of the simulation, checking that no one is falling too far behind, and picking up vocabulary items.

Student:	Game will become . . .
Kathy:	Scarce. What do you think that means? It will become scarce.
Tyrone:	Scary?
Kathy:	A little different from that. If you continue to hunt you'll probably shoot all the animals and the game will be scarce. There will be scarcely any animals left.
Tyrone:	Hardly any more animals.

At other times Kathy uses the built-in definitions for unfamiliar vocabulary.

Student:	We're going to crash. Oh what is that?
Kathy:	Do you know what it means to ford the river? [points to the screen] I don't think Tyrone and Anna knew what it meant to ford the river.
Deborah:	It's a walk.
Kathy:	Is there any way we can get some help to help us out. Okay listen up guys. Here come the definitions.

Bridget: (reads) To ford a river means to pull a wagon across with the ox still attached.

At other times the students are so engrossed in their adventures that Kathy's attempts at control are ignored and for a while she allows their interactions to flow.

Kathy: Okay let's stop this for just a minute and we will let Bridget and Anna get started on their trail and Tyrone and Deborah you can be their partners to help them get started.

Anna: I'm gonna . . .

Student: I'm not walking across.

Tyrone: How about (?) [points to the screen]

Bridget: Why do we (?) [points to the screen]

Student: That was easy.

Student: I want to (?).

Student: I thought there was more than something (?).

Deborah: I should have done that. Another one again [points to the screen].

Finally she steps in and asks everyone to click on "time out" so that she can get their attention and tell them to look at the whole screen and all the buttons. During this time the students realize that their health is poor although they are initially confused by the word "poor."

Tyrone: Bridget poor, Tyrone poor, Kyle poor.

Bridget: What are you saying. I'm poor?

Kathy: It doesn't mean that you're poor because you don't have money. Your health is poor. What should we do? Do we need more food? Maybe we should slow down the pace? Do we have a button for pace? Maybe we should go at a slower pace.

A little later the students use "poor" correctly as they have incorporated this new meaning of "poor" into their language systems. They use it spontaneously and unconsciously.

Bridget: Oh no my health is poor.

Deborah: How do I get my health up?

Kathy: Your health is bad over here Anna. You are suffering from exhaustion.

Anna: My health is poor.

Kathy: Your health is poor.

At the end Kathy asks the students what they have learned from the class and they answer as speakers from within the simulation. They are oblivious of the new vocabulary (e.g. poor health) that they have acquired.

Kathy: What did you learn today from the game?
Deborah: Don't go too fast.
Kathy: Why, what happens?
Deborah: Because when I went too fast I wasn't okay.
Anna: I learned how to hunt.
Kathy: Learned how to hunt.
Tyrone: And if your health is poor you can rest.
Kathy: Did your heath improve when you rested?
Tyrone: Uh-huh.
Anna: Mine's good.
Kathy: Good.
Bridget: Mine's fair.
Kathy: Health is fair. Well, maybe we'll get it up there, up to good.

In this discourse event the simulation itself is of central importance to the students. They appear to effortlessly enter the spirit of the program and their language reflects a form of dialogic interaction that would be difficult to achieve in a normal language class. While with the *Once Upon A Time* example, the computer itself provides the locus for real language, here the hardware has become more or less transparent as the students "live" the experience of traveling the Oregon Trail. The language they use to cross rivers, hunt, and look after their health is imbued with dialogic meaning that connects with life experience and goes well beyond mere linguistic comprehension. That this connection is powerful can be seen by the way that once new vocabulary items have been really understood (i.e. in experiential terms rather than abstractly), they begin to appear spontaneously in the students' own speech.

The simulation also enables the students to control their adventures and consequently to a great extent their linguistic interactions with Kathy. The flow is undeniably theirs and Kathy only intervenes at times to direct it, to slow things down and take advantage of the publicness of

information, and to make use of the anchored referents as she brings vocabulary and structures to their attention. At the start of the lesson the discourse is teacher controlled and is about navigating the program and word meanings. As the lesson progresses there is a discourse shift into the lived experience of the simulation, which puts the students in control. Kathy then moves fluidly back and forth between being a participant in the adventure and a "teacher." In the former role she interacts with the students as a more knowledgeable peer, offering suggestions and answering questions. In the latter, she moves outside the simulation to bring attention to new vocabulary and also to try to widen the students' focus, to act as a brake on their headlong pursuit of the final goal. Here, too, the language is dialogic as both the new vocabulary items and widening of focus are both firmly anchored in what are immediate living contexts for the students.

A tension that lies under the surface in a simulation like this is that the students have a clear goal (that of completing the adventure) that is unrelated to language, while the teacher might have quite a different agenda (e.g., language, literacy, math, and social studies goals). Here Kathy allows space for the students' goal to remain dominant so that when her own (teacher) goals surface, they are filtered through the lens of what she deems important to the students on a moment-by-moment basis. Consequently the issues she raises as she challenges the thinking of her students are never seen as irrelevant or abstract. The new vocabulary items and the unexplored buttons on the screen are accepted by the students as tools that can help them reach the end of the trail.

Widget Workshop

Martie teaches in a large, attractively decorated room with space for a row of computers along the back and side. In this class, four 8th grade students are seated at the computers and Martie walks around behind them, pointing, commenting on their screens, and asking questions. She is using the *Widget Workshop,* a program that can be used to simulate electrical, biological and mathematical connections. In one lesson she has her students connect hearts to different animals and then to notice the differences in heartbeat speed. She then builds on this activity to help students reach the goal – to construct a calculator that will be able to compute the number of seconds in a year.

Martie finds that while her 8th grade students have acquired good speaking skills in English, their vocabulary is limited. This affects their comprehension and production of the academic language that school requires.

> Angelo just came . . . last year from Puerto Rico, so he's only been here for one full year. He speaks very, very well. His parents really push him and do a lot with him at home. The other two have been in this country probably four or five years, so they're speaking fine. They just need an awful lot of enrichment. And vocabulary and writing skills is their weakness right now. So once they learn the vocabulary, I think their reading skills will be fine. I try to introduce as much vocabulary as I can to them.

She also faces a mixed ability grouping with Jean, a learning disabled child.

> Jean, in particular, has a really good ability to sound out words but her comprehension is very low. She's also classified as learning disabled and she can really fool you with her reading. But then when you ask her to tell you in her own words what she's read, she doesn't have a clue. So it's gone right over her head so I'm really working this year with her on having her rephrase something that's been read or having her focus on that.

Martie, however, turns the fact of mixed ability into a learning tool as she gets the more advanced students to explain to those who are having difficulties.

> And I think it's because the ones who do know more need more of a challenge and so to explain it to somebody else is a good learning tool for them too. We just don't have the luxury to have a class with all the same level of development.

As much as possible Martie likes to step back and allow the space for the students to solve problems. At the same time, however, she believes in keeping her students on-task and correcting their errors. She finds the computer a help here because it acts as a sort of intermediary between the teacher and student.

> I really think students need to be told if they've made a mistake. . . . But try to question them so they can come up with the right answer and feel successful that way. By guiding the questions I think it's possible to do that and I think the computers do help with that.

Martie feels that computer projects are highly motivating for the students.

> I know that when we do a project that doesn't involve the computer now they are disappointed. I've asked them to think about that too. You know, how would this lesson

> be different if we didn't have the computer or didn't do it on the computer and would you like it better the way you did it? They are very enthusiastic about the computer.

When they become involved in a practical hands-on activity like that of *Widget Workshop* the high level of motivation leads not only to animated dialog but also, Martie believes, to a higher level of thinking. A sense of ownership over the activity as well as the freedom to follow individual choices both help to provide a context in which language and thought are imbued with a goal driven and dialogical level of activity.

> They're really excited. Now they built this calculator and some of them were already thinking about, "Oh, I could do this." So it kind of motivates for transfer too. Once they see one idea somewhere then it makes them start thinking about other things that they could do or they would say, "What would happen if we did this or this?" and that type of thing. So it's basically a self-motivating program. It does excite them. I just think it's funny when they go "Oh my God, Wow, Cool." . . . you don't usually hear a lot of excitement like that over some of the assignments you give them in class. It definitely works as a motivating tool. They motivate each other because one person will do something and another person will build on that idea and say, "Oh I think I can do it even better.

For Martie it is the ownership provided by computer projects that is the crucial factor.

> It just brings up constant opportunities for talk, it prompts them to ask questions where in the classroom they would just be sitting there, they wouldn't be as actively engaged. This is theirs, they're into it. . . . A program like this keeps bringing up a problem that they have to react to, so if they don't know what to do they're always asking or telling someone. They get a lot of opportunity to converse about something meaningful. When you're doing a textbook lesson, they're really not into it as much because they're not actively . . . , it's not theirs *per se*. And like they're reading about some kids in the textbook and they like the stories but it's not like it's their own product that they are controlling. And then when something happens it's like "Help, I had an earthquake what can I do?" or something like that. Then everybody jumps to their aid immediately because they've had the same problems and I think that you get a kind of a kinship there. It's like, "This is what I did when I had that problem, and it worked" or "Don't do this because it won't work." I can see that kind of interaction is really facilitated best by a computer. Otherwise you'd be just having a discussion about a story and only a few of them, probably, would really be into the discussion because it's not important to them.

She also finds that with computers she can more easily focus the students' attention and the publicness of the medium helps her see what has been understood.

> I think the advantages are enormous because I can see immediately who's on task and who followed the directions. I can see immediately who needs help because I can stand behind and watch all the computers at one time. Whereas if they're sitting in the classroom you kind of have to go and look over to read what they're doing . . . In the classroom when you're pointing at a board or chart or something, you can't really tell if everybody's eyes are on it at the same time whereas at the computer I can see exactly what they're doing. It's easy to keep them focused.

She begins by telling the class that the purpose of the lesson is to practice following directions by building a widget, and she constantly probes with questions to build up her students' knowledge.

Martie:	Widget workshop. What is a widget? Anybody know?
Student:	A gadget?
Martie:	It sounds like a gadget doesn't it. What's a gadget?
Student:	A thing that a person uses.
Martie:	What made you think it looked like a gadget? [points to the screen] Look at the screen. What do you see?
Student:	Things all mixed together.

Martie deliberately encourages them to guess what a widget might be, as she believes that guessing from context is a valuable reading skill.

> I didn't think that most of them had used that word before. In fact, it's a made up word. It was interesting, though, to see that some of the ones with higher intuitive skills could figure it out by looking at the pictures on the screen that it was kind of an invention type thing. I find it's so much better for them to kind of come up with an idea rather than just wait for me to always be telling them the meaning. That's one of the skills I'm trying to teach them when they're working with the reading . . . [that] when you get a word you don't know, use all the possible clues you can to figure out what it is.

This interactional pattern continues in this vein as she explains the opening screen to the students and runs into a confusion with the word "hooray."

Martie:	What does it do?
Jean:	It makes sound.
Martie:	What does it sound like when you hit it?
Jean:	People.
Martie:	People doing what?

Jean: Screaming.

Martie: Screaming. What are they screaming?

Jean: Hey.

Martie: What do you think that word could be?

Student: Hey.

Martie: Hey or hor . . .? Hooray.

Student: Hooray.

Martie: What does "hooray" mean? Anybody ever hear the word "hooray"?

Student: No.

Martie: You never screamed "Hooray"?

Student: Yeah.

Martie: What does it mean? When would you scream "Hooray."

Martie says she is very careful to check comprehension since the time she got "burned" with the word "bank."

> I got burned one time . . . we were doing a story about the river and a deer came down to the bank of the river and in the journal the boys wrote "We went to the bank to get our money and we were really surprised to see a deer leap right over the bank" and I just didn't think that they wouldn't understand the bank of the river. So since that simple one went over their heads I just . . . anything that I think possibly could confuse them I check on.

Next she moves to the cutting and pasting options and the other on-screen icons and she continues to "teach" by alternating between asking questions and giving short descriptions. At times she connects the language connected to the program with their own lives.

Martie: What does that look like?

Brendon: Railroad.

Martie: Railroad tracks, right?

Brendon: Connecting.

Martie: Connecting right. These would be all to connect things, but do you know anything about electricity?

Brendon: You had it?

Martie: How many wires do you think come into your house?

Student: A lot.

Student: 20 or 40.

Martie: A lot. 20 or 40 wires coming in from the street to your house?

Jean: A million.

Martie: A million? Just think about what your house would look like if there were a million wires coming in?

Jean: I would die.

Up to this point the interaction is very teacher controlled as she introduces the program and guides them through the opening screens. Then as the students become more autonomous she begins to relinquish some of her control. This first happens with student questions to her. Instead of answering, she passes them on to other students.

Jean: How'd you do it? How'd you do it?

Martie: Can you tell her Brendon?

Brendon: It measures (?).

Then she asks them to choose the hearts of different animals from the menu and asks them to guess which one might be the fastest. The students become extremely interested in finding out which heart beats the fastest and slowest and as they do so, she gently introduces a short writing activity.

Ezra: Which one's the slowest? The turtle? The elephant?

Martie: Now that's something I'll let you figure out later. If you can't remember which one . . . What would be a good thing to do if you really were interested in this and wanted to remember?

Brendon: Write it down.

Martie: Write it down somewhere. You could take that message board and put the names of the different ones right on your screen if you'd like to.

Next she has the students each choose four animals and start to build a widget with the heart as a power source. She tells them how to connect up the heart with electricity to the speakers so they can hear their hearts. Gradually as the students become familiar with the program they assume control over the discourse. Martie becomes less of a "teacher" and more a participant in the dialogic interaction. Finally, however, she gently brings the interaction around to a language goal (making comparative statements).

Jean: How do you know when you're getting (?)? What Ezra?

Ezra: You can connect all these to one speaker.

Martie: Do you think that would work?

Ezra: Yeah watch. You can connect it with that here and . . .

Martie: Maybe you could . . . What would you need in between? You'd need like one of those with all the different connectors [points to Brendon's screen]. What do you think?

Jean: How do you push . . .?

Martie: Is that the rooster's heart?

Ezra: That's the gerbil [points to screen]. I got the gerbil. See watch.

Martie: What do you think? Can you make any statements telling me. He said the gerbil's the fastest.

Jean: The tortoise is the slowest. The cow is faster.

Martie believes that the hands-on nature of the activity will help both the language and the content stick in the students' minds.

> I don't like always to give them the answer. I mean when they were talking about which one could have been the fastest, it would have been easy to say "You're right the elephant or the tortoise is slower than the gerbil." But now by them actually doing an experiment using the hearts they'll find out for themselves and I think they'll remember better.

The next day Martie asks them what they thought of the program and gets an enthusiastic response. She tells them that now things will become more complicated as they are going to build a widget calculator that will be able to tell how many seconds there are in a year. She ascertains that this will involve five different calculations. Then she tells them how to organize their workspaces and to make labels for the different mathematical operations. The students become immediately involved in this activity and ask numerous questions.

Martie: Now we're all set. Okay now go into the letter bin.

Jean: The letter?

Martie: Uh-huh. And get a label. Click on the label. It says label. We need five labels. One on top of each of those.

Ezra: Can it be on top?

Martie: Well it can be underneath them but it will get in the way of your wires.

Jean: Where do you want the labels?

She then instructs them to go to the parts bin and get multipliers and switches and hook them together with connectors. It is a complicated process, and the students are very focused on the task. Martie encourages them and asks real dialogic questions.

Ezra:	This takes a lot.
Martie:	This takes a lot I know. You're doing an excellent job. Can you get four of those Jean? And Shawntell get four of those. Can you see how the boys have them arranged? Anybody have any questions? What do you think so far?
Jean:	Good.
Martie:	Is it easy or hard?
Students:	Easy.

Next she gets the students to put numbers into the boxes and asks them to read out their numbers before they connect them up. As they begin to do so, the language between teacher and students becomes extremely interactive, as she struggles to explain what to do. With a program like this total comprehension is required; there can be no half measures in the construction of a mathematical instrument.

Martie:	Okay, now just a second. Go to the second multiplier [points to Ezra's screen] and put it straight across to the switch. Now split it. Why am I saying . . .?
Ezra:	Where's (?)?
Martie:	[points to screen] Because you're trying to connect two of the same thing.
Ezra:	But it won't connect to one.
Martie:	You don't want that. You have to connect this one.
Student:	(?)
Martie:	Can you connect the second multiplier? [points to Brendon's screen]
Student:	Yeah.
Martie:	No, your multipliers.
Student:	Are (?)
Martie:	You're doing excellent so far. Why did that disappear? Connect this. All three of those, right.

The final stage comes when the calculators are ready and Martie asks them to push and see what happens. Their responses reflect their feelings of involvement in the whole process.

Martie:	Okay, push. Go and see what happens.
Jean:	Oh my God.
Ezra:	Cool.
Jean:	Oh my God, look. I've got numbers.
Martie:	You've got numbers. What do the numbers say?
Ezra:	I've got thirty-six.
Student:	I've got thirty-six too.
Martie:	Thirty-six? What happened there?
Jean:	I've got three thousand six hundred. Zero, zero, zero [Brendon points to Jean's screen]
Martie:	All right. So, for the first answer. How many seconds in a minute? What's the answer?
Ezra:	How many seconds in a minute? There's three hundred and thirty-six . . . three thousand six hundred.
Martie:	Three thousand six hundred. Is that what everybody got?

In the next stage Jean has made some wrong connections and does not get the right answer. While Martie points out her error she tries to get the other students to explain what is wrong. The students work collaboratively around Jean and struggle to express the large numbers involved. It is clear that here they are being challenged to get their tongues around the numbers.

Martie:	How many minutes in an hour? [points to Ezra's screen]
Ezra:	Eighty-six thousand four hundred.
Martie:	Is that right Brendon?
Brendon:	Yeah [looks at Jean's screen]
Martie:	Do you know what Jean did wrong?
Jean:	Yeah, I forgot to connect some.
Martie:	Okay there was a (?). How many hours in a day?
Ezra:	Six hundred . . .
Brendon:	Six thousand . . .
Ezra:	Six hundred and four thousand four hundred, I mean eight hundred.
Martie:	Can you read it?
Student:	I got my answer.
Jean:	Six hundred, four thousand four hundred [points to her screen].

In these two lessons, Martie and her students have been engaged in a hands-on activity that keeps all talk firmly anchored to what happens on the screen. New language and concepts are public and manipulable. With the focus totally on the program the students operate linguistically in the here-and-now. Their language is real because it arises from what they are doing, and what they are doing has real consequences. It is only Martie who has a definite language agenda (practicing comparatives and the introduction of particular vocabulary items). As in the *Once Upon A Time* lesson, there is no room for the usual ambiguity in communication. *Widget Workshop* demands precision and, consequently, perfect comprehension on the students' part. Throughout these lessons the students can be seen listening intently to Martie's instructions and negotiating meaning with her, their peers, and the electronic texts they use.

As Martie is introducing this program to the students, she retains a high degree of control over the discourse. She states overtly at the beginning of the lessons that one of the aims is to practice following directions, and as the lessons unfold she does indeed give many directions. However this does not mean that the students have no autonomy. They are in control of their computers and they choose their animals and hearts for the first lesson. Even in the second lesson (which was more or less scripted in advance by Martie), the fact that the calculators are being created by the students leads to a sense of accomplishment and ownership ("Oh my God," "Cool"), which would have been difficult to achieve in a text based lesson.

The discourse in these lessons is also far from typical classroom talk. While Martie begins with "teacherly" instructions, she soon adopts a scaffolding approach in her questioning as she uses both her questions and her students' answers as building blocks in their construction of widgets. Towards the ends of the two lessons, as the students come closer and closer to realizing their constructions, their excitement and interactions increase as they interject more and ask more questions. Martie facilitates this flow by becoming less "teacherly" herself as the lessons progress and assuming more the role of a collaborator/more knowledgeable peer.

A belief that is widely held by teachers everywhere is that motivation is the key to learning, and in this respect the introduction of appropriate computer technology can have dramatic effects. Kathy remarks that her students, being well-behaved and polite, would have written a story about a farm on paper. However the task would have (most likely) remained abstract and removed from concrete experience without computers. For all three grade levels the tasks

undertaken would have been completed mainly as a language exercise and would have lacked the basic urgency that underlies a real need and desire to communicate. However, with the computer as a mediating tool and one around which communicative interaction takes place quite naturally, the desire to communicate becomes an underlying motivating force. Juana and Chang do not want to stare at a blank screen, and the concrete nature of manipulating the keys and navigating the software transforms an otherwise abstract task into *activity*, which is at the root of human learning in Vygotskian terms (Vygotsky 1982). While the teachers' goals include the creation of stories, the learning of vocabulary, familiarization with mainstream content knowledge, and the following of directions, at each step of the way the students are completely absorbed in the progressive stages of activity.

There is also ample evidence in these sequences that Kathy and Martie challenge the thinking of their students. Kathy uses the three-way graphic/text/audio capability of the software to provide help with word recognition and alphabetization in the *Once Upon A Time* lesson. With *Oregon Trail*, she acts as a brake on the students' headlong enthusiasm and challenges them by gently insisting they attempt to understand all the options available at any given moment. Martie challenges her students' ability not only to follow directions precisely, but also to talk about large numerical figures.

The unique features of e-texts combine in these sequences to support and enhance the learning experiences of the students. Both Kathy and Martie are excellent teachers and would be effective without computers, but with them their interactions with their students become charged with a dynamism that would be difficult to achieve otherwise. Thus the computer here has become a dynamic medium stimulating dynamic activity. The publicness of e-texts and the way that this allows immediate critique allows the teachers to enter and leave group interactions effortlessly and seamlessly. They have instant access to problems or errors and are able to make on-the-spot instructional decisions without having to interfere overtly with a student's private space (i.e. picking up a draft copy that may not be clearly legible). Of course these features could be used to evaluate and even ridicule a student in front of his peers, but used wisely, as in these sequences, they provide a means for the teacher to join ongoing interactions and gently steer students' focus in directions that make pedagogical sense.

Electronic texts also occupy a territory somewhere between the stability of the printed word and the ephemeral nature of spoken language. The instability of text on a computer screen necessitates language interaction as long as there is more than one person involved in the task. Yet the screen also slows down the speed of direct interaction and allows learners the space and control over usable referents to formulate the language needed for the interaction. The medium also imposes a transparency that is generally lacking in direct communication and which can be very helpful for learners as messages have to be both clearly sent and comprehended for any progress in the activity to take place. Finally the nature of both the computer hardware and the on-screen locus of information provide an environment of anchored referents that support learners in their attempts at communicative effectiveness.

The preceding narratives illustrate the activity and accompanying discourse that is typical of these classrooms. These learners are communicating in authentic, literacy-oriented contexts that include teaching one another how to use the computer, sharing their excitement about new discoveries, and negotiating between both intended and received meanings represented in e-texts. In short, e-texts are serving as real, immediate contexts for authentic talk, thinking, and understanding in the target language. In the following section we present an emerging schema of the interplay of contributing variables that constitute the ESL and e-text environments we have observed.

The ESL and E-text Environment

From the preceding instructional scenarios, their accompanying video talkback sessions with teachers, and interviews with district administrators we are seeing the interplay of many conditions that make these ESL and e-text environments work. Kathy and Martie's teaching is a multifaceted and multidimensional craft. They are orchestrating rich, tightly tailored instructional activities for very diverse groups of children. They are consistently responsive to the differing needs of each child. They make a myriad of moment-by-moment decisions concerning each child, the processes of complex tasks, mainstream/content requirements, and what makes sense in the light of their personal epistemologies concerning language and literacy.

Current views of the second language acquisition process see several factors from the affective domain as bearing great impact on successful learning. This complex of factors includes: a learner's attitude towards the language to be learned (this is many times determined by attitudes toward the culture in which the language is spoken); self-esteem, perceived attitudes of the new culture towards the learner's language and cultural heritage; motivation; a learner's level of inhibitions and willingness to take risks; a learner's beliefs about teaching, learning, and the role of the teacher; and the level of anxiety towards learning in general and learning language in particular that a student possesses (see Ehrman 1993; Schumann 1978) This complex of affective factors can both positively and negatively influence the effective acquisition of another language. A major implication for the affective complex as tied to success is that when teachers, classrooms, schools, and the communities in which they reside respect and value those whose language and culture is different and create safe, caring, and nurturing environments in which language is taught, success is most likely.

These two environments for ESL and technologies can be characterized as relaxed and empowering. The hands-on, student-centeredness that the instructors orchestrate, using computers as tools for combined autonomy and collaboration, result in an atmosphere highly conducive to the growth and development of readers, writers, and speakers of both social and academic English. There is an overall sense of comfort and enjoyment in these classrooms:

> It's very informal in this setting with kids in a small group. Back in the classroom, I think these children often are quieter because the room is so much larger and they don't have the opportunity so easily to say "I don't understand" or " somebody help me with this" or "Oh, let me show you how to do this." I think they grow so quickly in here. (Kathy)

To some extent this comfortable environment is clearly inspired and supported by the presence of the computer.

> I think the fact that the interaction with the student is so important and that computers do enable this to happen in a very natural way . . . it's not like they're sitting at a desk and they're afraid that somebody's going to call on them and they're not going to have the right answer. And it's just a much more relaxed atmosphere when they're sitting back there by the computer and it does encourage the conversation. I think that's an important part of it. (Martie)

The perception that the computer is a tool for discourse is a common one in the Indian River Central School District. Administrators and teachers continually emphasize the word 'tool' in their discourse about the machine's role in these schools. In the same breath they also emphasize the catalyzing role computers can play in stimulating rich talk and action as they are being used as tools. This is likewise reflected in our observations of actual practices where a unique discourse structure seems to naturally evolve by virtue of the machine's presence and use. The 'computer as springboard for talk' aspect is also echoed in teacher and student testimonials.

Not only is electronic text stimulating thought, action, and talk about that thought and action, but it also serves a 'by proxy' role in supporting talk that might otherwise not be possible. What appears on the screen belongs to the child, who in turn experiences empowerment by demonstrating capabilities she might not otherwise be equipped to express.

> The computer is a self-motivator. The kids are just naturally interested in the computer, and I think it's a chance for them to show what they can do or to explore and take a risk without having to speak. I can have a beginning speaker in here who knows no English at all and is able to navigate using the computer and if a picture appears, we can talk about it, I can say the name of it in English and the child can tell me in his/her native language and we can just go from there to learn more about whatever that picture is. They can develop a lot of vocabulary and the thought processes that go on. (Kathy)

Both Kathy and Martie cite the ease and comfort with which children discover, create, and converse with and around the computer. Their testimonials point to children sufficiently comfortable in this environment to take risks:

> In this class one of the first things we do is talk about feelings and because this is a special kind of class we may ask you to do something or we may tell you that something is not as good as it could be but it's not because we don't like you. So they're kind of comfortable with having criticism as long as it's constructive, and we never would hurt anybody's feelings or laugh at each other. So they're real good at that. The other thing is . . . I think they're more willing to take risks. One thing I've noticed with using computers at this age level is that the students don't know what they're doing but that doesn't inhibit them. They get in there and they click everywhere and . . . learn . . . by trial and error and that's a good point. . . . I don't think they feel threatened. I think they just become part of it and they're not afraid to take a risk. (Martie)

A low-affect atmosphere appears to result from a leveling of the playing field as regards expertise and authority. As we will see later in discussion of teacher epistemologies and practices,

the teachers share a good deal of authority with their students, both in terms of negotiating content and the technology itself. The ESL children interviewed apparently understand this as beneficial:

Interviewer:	When you ask the teacher for help and she comes over and she doesn't know exactly what to do, how's that make you feel?
Student 1:	Well, it makes us feel good because then we can all work at it.
Student 2:	We can all learn at the same time.
Student 1:	Yeah.

(Fourth graders interviewed about using computers in their classroom)

Both Kathy and Martie appear to be adhering to what Hill and Parry term "a pragmatic model of literacy"; that is, a conception of literacy that "treats text as a social instrument, readers and writers as embodying social identities, and the skill of reading as extending beyond decoding and use of relevant knowledge to socially structured negotiation of meaning" (Hill & Parry 1992:433). The discourses of literacy are "not mastered by overt instruction, but by enculturation into social practices through scaffolded and supported interaction with people who have already mastered the Discourse" (Gee 1992:114). Kathy and Martie view themselves as guides and mentors in a process of initiation into the local academic discourse community, and while they work for balance of form and meaning, their focus is primarily textwork in the broadest sense; their role being to initiate this special population into that world.

Kathy and Martie are very clear about their teaching roles in general, and their roles as task designers, orchestrators, facilitators, and scaffolders in particular. They see their roles as uniquely supported by the technology, with the technology representing a wealth of opportunities for them to practice their craft in enhanced ways. They report that the number of "teachable moments" is far greater than in the traditional classroom due to the high level of activity and engagement happening around text and language. Unlike traditional forms of instruction, they find that in this environment their roles are varied. They plan relevant tasks, guide their learners' processes through those tasks, and model and scaffold the language and concepts learners need. Theirs are democratic environments where a great deal of authority shifts to learners, who take on the role of guide for others.

The formal notion of 'scaffolding' originated with Vygotsky (1982) who pointed out that optimal learning takes place when it is supported or 'scaffolded' by adults and/or more capable

peers. It is through working through a linguistic or conceptual challenge with a 'leg up' from others that we eventually become competent in what we are doing at the moment as competent participants in the immediate discourse community, and later as independent learners. Scaffolding takes the form of focusing questions or cues that alert the learner to possibilities, guide thinking and action, and assist in assessing successes and failures, and takes the form of being prompts and cues that push learners to go further. Not only do Kathy and Martie continually adjust the complexity of language and concepts according to the current stage of development for individual learners, but they also provide scaffolds that assist them with new challenges. While shaping time around the computers as one for active communication, Kathy and Martie are encouraging new forms, new structures as well as new ideas – especially new vocabulary that gets interwoven with discourse and accompanying activity.

> I want to encourage them to read and to speak out loud because sometimes they just move so quickly it's all internal . . . I'll ask them how'd you know what that means, or where did you get that? So I think I'm continually quizzing them or interviewing them. I just want to hear what's going on inside of them. I want them to verbalize it. (Kathy)

Second language acquisition is optimal in classrooms where learners have opportunities to engage in both planned and unplanned discourse in instructional contexts that encourage students to try out new linguistic structures and functions (Johnson 1995). In our study, we observed learners participating in both planned and unplanned discourse in what Nystrand (1990) has described as dialogically organized instructional contexts. Instruction in the contexts we studied focuses on problem solving activity and, in the ensuing classroom discourse, teacher questions are authentic and student responses are valued and taken by Kathy and Martie to be serious explorations of lines of inquiry. They are evaluated not in terms of how they approximate prescripted knowledge, but in terms of their implications for affecting transformation of teacher-student, co-constructed knowledge (Nystrand 1997). Student responses are elaborated upon and become part of the substance of the problem-solving discussion.

> I'm always looking for something that isn't going to just give me a "yes" or a "no." It's always a "Why did you do this?" or "What do you think abut this?" type of question. . . . When I say to them "What category are you? A city or a town" and if they say a town, then I would come back with something like "Well how do you know that?" . . . and they have to know why they have 1,000 people. (Martie)

According to Bakhtin (1981), all discourse is essentially dialogic. In dialog, speakers utter statements in response to, and in anticipation of, others and these are "sequentially contingent" upon each other. A dialogic perspective in instruction focuses on the intersection of multiple voices in the classroom, in particular on the role that it plays in learning. Understandings evolve from these unique intersections where there occurs the interplay of two or more consciousnesses (Bakhtin/Medvedev 1985). Both Kathy and Martie strive for dialogism in the classroom and they recognize in these intersections the moments of possibility for teaching and learning. Opportunities for children to engage dialogically mean more negotiable input/intake with which they can acquire the target language. In these environments, they are sufficiently motivated and engaged in tasks that the course of their work and accompanying talk never shuts down or strays. The children, in short, are given some authority and take this quite seriously as they control the machine and assist one another.

ACHIEVEMENT

Given these supportive contexts where e-texts serve as venues for learners to think, create, and visually demonstrate their work, a strong sense of achievement is constant. Whether it be successfully figuring out how to master a tools-based function or assembling an elaborate, content-rich media presentation, learners, their peers, and their teachers continually witness accomplishments. Table 2 (below) represents the types of achievement reported by stakeholders and evidenced in observations. Each is discussed in light of the New York State English Language Arts (ELA) standards and accompanying curricular concerns that serve as yardsticks for achievement within public school ecologies. Each is also framed by perceptions of student achievement as regards 1) second language acquisition (SLA), in this case, English; 2) acquisition of academic literacy skills; 3) acquisition of technology skills.

Moment-by-Moment Achievement

In these ESL classrooms, planning for instructional objectives – what learners are expected to do – is largely based on moment-by-moment language assessments that gauge and characterize a learner's English language and literacy competence. That is, these teachers utilize their understanding of each child's level of linguistic and literacy abilities as cumulatively evidenced and as evidenced through what children say, understand, write, and read on a moment-by-moment basis. The usually widely diverse nature of ESL populations makes this common practice (Johnson 1995). Moment-by-moment assessments are facilitated by e-texts and the processes instructors orchestrate with and around them. By virtue of the computer screen, learner processes and progress are immediate and visible, thereby providing concrete anchors through which moment-by-moment oral/aural assessments can be undertaken.

> I like it in my classroom when I have more than one student and I want to see how well they listen. I put them on the computer and I can give a direction and then I can instantly see who can understand it and follow it and who's having trouble. (Martie)

The computer can also be used as a diagnostic tool. For example, when a new student arrives with no records, games like *Math Blaster* and *Number Maze* provide an enjoyable and easy diagnostic.

Beginning ESL students who may not otherwise be able to participate in empowering activities can accomplish quite a bit on the computer:

> But even the beginning girl, who just arrived the week before, was able to build a city. It took a lot of encouraging words, like showing a lot of modeling, but once she got the few words she needed, it really helped her to do something too. (Martie)

In addition to these ongoing language and literacy evaluations made and acted upon by teachers, the broader criteria comprised of the statewide ELA standards and the mainstream curriculum are additional criteria upon which these moment-by-moment assessments are based. In the case of working with the computer, New York State's ELA standards 1 and 4 are addressed particularly well. Our observations consistently reveal activity that leads learners to "listen, speak, read, and write for information and understanding." They "collect data, facts, and ideas; discover relationships, concepts, and generalizations; and use knowledge generated from oral,

written, and electronically produced texts" (Standard 1). The learning activity we observed with e-texts was clearly designed so that learners "use oral and written language that follows the accepted conventions of the English language to acquire, interpret, apply, and transmit information." A great deal of modeling and cueing of these conventions on the part of the teacher and, when present, classroom aids, supported learner engagement in the active use of English while they undertook academic work.

Standard 4 – "Students will listen, speak, read, and write for social interaction" – is a central feature of these ESL computer classrooms. Sociocollaborative practice with and around machines leads to optimal forms of constructive social interaction. The building of competencies reflected in the standards and in mainstream curricula are instantiated in the activity we have observed. Such carefully designed and orchestrated language and literacy activity using technologies are clearly germane to the mainstream overall and are therefore continually integrated into activities and assessments. The added benefit of technical skills acquisition is an integral part of these ongoing processes.

Students themselves value their computer work and experience the positive effects of their moment-by-moment successes. In addition, the skills and abilities they develop extend to their mainstream classroom work. In this case, Martie recounts the impact of the ESL and technology work on students' learning in the mainstream:

> It stays in their mind. Right. They think about this [the software-based projects they do] a lot. It's like really a part of their day and they'll come in and they'll say, "I was thinking in Science . . . you know maybe this is bad too, because in Science class I got this idea about how I could build this. Do you think I should try it?"

Student Products

Both Kathy and Martie are very committed to ongoing assessment, learning milestones, and student products as evidence and reinforcement for their achievement. Part of their orchestration of computer-based work involves having learners focused on what they will do and learn. As they work on the computer (in this case the *Sim City* program), Martie has her middle school

Crystal

CITY LOG FOR Claudiaville

DATE 10/7
BEGINNING BALANCE OF FUNDS 20,000
PURCHASES AND ACTIVITIES power plant 3,000 house 300, power line, roads, park

ENDING BALANCE OF FUNDS 13,759

DATE 10/8
BEGINNING BALANCE OF FUNDS 13,659
PURCHASES AND ACTIVITIES house, Road, Power Line Mall, park I have Etown

ENDING BALANCE OF FUNDS 4,063

DATE 10/10 868
BEGINNING BALANCE OF FUNDS 4,063
PURCHASES AND ACTIVITIES police Dept, house Road, Power Line

ENDING BALANCE OF FUNDS 3955

DATE 10/14
BEGINNING BALANCE OF FUNDS 3,955
PURCHASES AND ACTIVITIES house, power plant roads, I have a City

ENDING BALANCE OF FUNDS 1,000

DATE
BEGINNING BALANCE OF FUNDS 1000 [redacted]
PURCHASES AND ACTIVITIES house & road start wand, mall, starts power plant

ENDING BALANCE OF FUNDS 343

Espana mantiene una tradicion llamada corrida de toros, y mexico sigue la misma tradicion. Se trata de un toro y el torero. El torero se esconde detras de un lienzo rojo y el toro lo sigue hasta que el toro se cansa y es cuando llega la hora de que el toro salga de la plaza. Mi tio que vive en Mexico es un torero profecional.

Lilia Olivo
Jose D. Ramirez Jr.
Anthony Ramirez
April 18, 1996

Spain mantains a tradition called CORRIDA DE TOROS (bulls fight), and Mexico continues that same tradition. It's about a bull and a man. The man hides behind a red piece of cloth and makes the bull go after him until the bull gets really tired of running. Then it's time for the bull to be out of the ring. I have an uncle in Mexico that is a professional bull fighter.

Lilia Olivo
Jose D. Ramirez Jr.
Anthony Ramirez
April 18, 1996

students keep an extensive log of their decision making and the outcomes of their decisions. As she describes:

> I want to see something that's a response, I want more than just on the computer, because at the end of the period you have nothing to show that's hard evidence that I can say "This is what I did this period," . . . but when they have a response log that they have to complete, then that gives me an idea of their writing kills too. . . they don't always realize how much work and actual problem solving they're doing.
>
> They can print it (their story) out, take it home, read it to their parents, read it to brothers and sisters. So it's like creating actually their own workbook pages or books that they have that they can read and it's their work. So it's like successful because they're excited about it too.

Such products can be viewed as literacy icons. Sharing these is an essential part of the instructional dynamic; especially teacher activity that fashions opportunities for students to articulate the thoughts and processes behind their products. A look at the New York State English Language Arts standards reveals that they are clearly evidenced in such student products:

Standard 1:	Reading, writing, and communicating information
Standard 2:	Understanding diverse social, historical, and cultural dimensions of what they read and write
Standard 3:	Development of critical thinking skills
Standard 4:	Communicating for social purposes

The standards are reflected in the process of creating products, the products themselves, and the activity involved in presentation, reflection, and evaluation of those products.

Mainstream Achievement

In three cases we observed different ESL students 'come to the rescue' of school personnel who were having difficulty with computers. In each case the ESL student, using the technical expertise they gained as a secondary benefit of their ESL experiences, stepped forward and remedied the situation for the struggling adult. In one mainstream classroom, a fourth grade

teacher put her ESL children in charge of training herself and other mainstream students in how to use the new machines that had been delivered to her classroom. In this regard, the technical skills these children have mastered have provided them an edge and raised their level of prestige within the mainstream. The District Specialist illustrates the ESL students' social/academic edge with technology:

> Each of the ESOL children in 4th grade did a report. They scanned pictures from their home country. . . . This one little girl was from Thailand and she had a picture of her house. It was made of sticks. . . . And she had scanned pictures of money, costumes, whatever she had taken from her own stuff at home. She put it in the slide show to explain what it was like in her home country and then the ESOL teacher had her do a presentation for all the other 4th grade kids in her classroom. The 4th grade kids watched the slide show and they were like "Did you do this?" And she explained. They asked her all these questions about how did you get the picture of your mother onto the computer. And so the little girl explained how she did it and how it worked and the ESOL teacher said that the kids were very jealous of the fact that here she could do this and they wanted to learn. It really elevated her among her peers.

When interviewed about the integration of state English Language Arts standards into their daily instructional routine, teachers were quick to point out that while these standards were already part and parcel of the kinds of language and literacy activity they orchestrated as a matter of course, they were now in the process of refining their articulation of these for evaluation purposes as mandated by the state. This process, they felt, was a valuable one in that their ongoing dialog with mainstream language arts teachers would be more closely aligned. They also felt articulation through the standards would help them be more effective in explaining the specific strengths and needs of their students.

The direct linkages these ESL professionals make between the design and conduct of their ESL class activity and the goals and processes of children's mainstream classes demonstrate the power of the enrichment as opposed to the remediation paradigm. ESL teachers work in tandem with their children's subject matter teachers to ensure their children are skilled in the language and concepts they need to achieve in the mainstream and enrich students' skills and abilities accordingly.

District

District administrators and teachers speak passionately about their commitment to teaching children beyond the facts; teaching skills that extend far beyond content to real life participation in problem solving. Tangible evidence of learners doing 'real literacy' with and around computer tools bespeaks the success of their efforts in this regard.

While this district reports excellent exit rates for their ESL children as compared to statewide rates, they, like many other technology-rich districts around the country, are hesitant to claim direct links between standard measures of achievement and the use of technology (see Means & Olson 1995). Traditional examinations are not well aligned with the curriculum and practices of schools in the process of implementing their own interpretation of state standards, nor with the unique forms of learning and achievement possible through 'beyond the facts' learning with technologies.

Insofar as to how the ESL program is perceived by district stakeholders, it is clear that the program is held in esteem, even to the extent that it is frequently held up as a model for the mainstream. The ESL teachers, because of their rich experiences in applying technology to learning, are frequently asked to teach in-service workshops for teachers of all levels and areas.

The respect for these programs within the district is so great that, as the district technical specialist candidly points out, they should be emulated by others:

> I think the things that they've done in ESOL would carry over into the classroom [mainstream]. If we did the same things with a regular classroom, had the same opportunities, I think we'd find a big increase in abilities. It's all in how the teacher's utilize it.

Parents

Parental respect for the ESL program runs uniformly high. The perception that this is enrichment rather than the more common one that ESL is in some way remedial is reflected in Kathy's statement:

> Once they [the parents] come in they're just so overwhelmed and it's an enrichment program for their children and they just want their kids in here and they want them to stay as long as they can. And it's kind of sad when I say, "Well your child has scored high enough he no longer needs our services." It's kind of like, "Oh, don't do that yet, we still want to have our children involved."

Their children's accomplishments, in many cases made immediate through computer-generated products, are a source of pride and admiration. They see their children as 1) respected members of the school community; 2) competent and capable with the new language; and 3) having attained skills critical to their futures as students and adults.

These learning contexts produce tangible products, positively influence stakeholder perceptions, and bring a population who is more typically marginalized due to their bilingualism into the metaphorical mainstream of the wider learning community. Both the products and the processes we observe attest to learners' literacy achievements. The processes teachers orchestrate and support around technologies is rich in the kinds of literacy and language activity that help children develop competencies required for successful participation in their schools and community.

IMPLICATIONS

Detailed analyses of these computer-based activities serve to illustrate the nature and dynamic of second language learner literacy skills development as they can occur in interaction with electronic texts. Perhaps the most striking characteristic of the activity examined is the catalytic and supporting role e-texts play in the language and literacy oriented conversation that these teachers orchestrate with, through, and around the medium. Both Kathy and Martie have adapted their practice to take advantage of the unique features of e-texts. They use the inherent instability, publicness, and malleability of on-screen information to give language a concrete reality that is often lacking in instructional practice. When their students are organized into groups or dyads working collaboratively, the instability and concreteness of the medium help to stimulate a desire for communication that in turn is aided and supported by the anchored referents in the displayed information. As a result, their ESL students are enticed into linguistic

interactions they might otherwise avoid and an awareness of the forms and functions of language that would otherwise elude them. Not only does the medium contribute to a facilitative environment, it also makes possible a rich variety of discourse genres as the students talk to each other and to the teacher. They talk about the hardware and software as concrete tools to be manipulated; they talk from within software simulations as though their adventures were lived experiences; and they talk about language as a tool with which meanings can be expressed clearly and precisely in visual form. This variety of talk would be extremely difficult to organize in the traditional classroom, though it does come with a price. Both Kathy and Martie have been prepared to allow their roles as "final arbiters of knowledge" to become fluid. At times they are collaborators, jointly seeking to resolve problems, while at others they gently scaffold their students towards more challenging tasks. At the same time, behind the fluidity and facilitatory nature of much of their discourse, their agendas as language teachers remain clear. Whenever they believe it will be beneficial, they do not hesitate to focus their students' attention on linguistic form.

As previously noted, most teachers do not enjoy the supportive conditions we have observed at Indian River. They often struggle with large classes, indifferent administrations, and negative attitudes, and feel inadequate when faced with the latest technological innovation. Yet, at the same time, the nation's population of linguistic minority students is growing, and schools are facing the challenge of providing for their language and literacy needs. On the one hand, federal and state support for programs that see to the needs of non-native speakers of English has been steadily decreasing while, on the other, funding has been increasing for technology. Technology is widely viewed as a means of helping remedial education in general, a view that is based less on empirical fact than on the intuitive appeal of having a machine "take care of the problem" quickly and economically (Branscum 1992; Cummins & Sayers 1997; Griffin & Cole 1987). In other words, the appeal of technology for learners of ESL is tied to the perception that there is a "problem" for which a "solution" exists. However, as is clearly reflected in the ESL and e-text situations described, technology does nothing without thoughtful, dedicated, skilled instructors who exploit specific features of the technology in their ongoing efforts to enhance the language and literacy skills of their students.

What is clear from our observations in Indian River is that Kathy and Martie do not use computers in a mechanistic way to "solve problems." For them the computer is a tool that has become an integral component of a complex social dynamic in which linguistic interactions between people remain of paramount importance.

Conclusion

Carefully crafted teacher use of electronic texts demonstrates the real and potential roles of the medium and its unique features to facilitate language and literacy development. While the contexts described in this report represent a very special case – a unique population, small class sizes, well trained teachers, district support, and positive attitudes – and as such are not representative of the majority of public school contexts, they nonetheless contain valuable lessons to be learned regarding specific features of electronic texts and what these features imply for second language and literacy learning as well as for developing notions of an 'electronic literacy'. Central to each is the role the instructor plays in orchestrating constructive, literacy-focused activity around machines. Features such as publicness, democratization, anchored referents, and malleability strongly support such activity and, in the case of these exemplary classrooms, serve to augment children's facility with the language and concepts that make them successful in school. Close examination of these forms of instructional activity given the features of e-text that appear to be supporting and even enhancing this activity, reveals generalizable approaches for focusing on and working with language and literacy that can be applied to other contexts and across disciplines. The most frequently exploited features of the technology can be useful foci in teacher training. Highlighting the concrete aspects of the medium and how these can be called into the service of the kind of sociocollaborative activity that supports language and literacy development can contribute to teacher epistemologies concerning the role of instructional technologies in teaching and learning in general, and for language and literacy instruction in particular.

Language professionals orchestrate and support social interaction around any number of different forms of related realia to elicit thinking and communication in the target language.

Electronic texts represent one of many resources that are being integrated into instructional activities. Our observations of exemplary uses of electronic texts with learners of ESL provides working examples of this integration and offers a clear view of unique features of electronic texts shaping novel, empowering roles for teachers and learners as well as accompanying forms of constructive, literacy-centered discourse; discourse that is in keeping with the needs and goals of the second language and literacy learner. We have observed activity rife with reading, writing, speaking, listening; in short, communication stimulated and supported by features of e-texts and the careful craft of exceptional teachers.

Computers quickly obsolesce. They break, wear out, and become too cumbersome to deal with. However, language and literacy rich routines and rapport – the kinds of crystalized operations evidenced in our observations of the ESL and electronic text ecology – continue to be the developmental nexus. That these supportive and constructive forms of discourse persist, move fluidly and fluently across changing megahertz, platforms, and peripherals, is testament to the primacy of the human dimension in instruction with any tool.

ENDNOTES

1. We use the term 'technologies' to refer to computers, multimedia, and telecommunications.
2. The term 'electronic texts' refers to any information displayed electronically on a computer screen.
3. All names except those of the students are actual.
4. In the Indian River School District the term 'ESOL' (English for Speakers of Other Languages) is used in preference to 'ESL' (English as a Second Language).

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APPENDIX A: UNIQUE FEATURES OF E-TEXTS

1. **ANARCHY**
   This feature directly contrasts with traditional linear/hierarchical forms of representation characteristic of the print medium, especially school-based print. This feature is defined as learners exercising volition and control over the order and direction of their interaction with electronic texts. Evidence is discourse and action that reveals learners interacting with information in an anarchic, rather than preset, linear fashion.

2. **PUBLICNESS**
   The feature of publicness is defined as public nature of electronic texts that prompts, supports, and facilitates rich discourse on the part of learners and their teachers.

3. **INSTABILITY**
   Electronic texts are unstable. Information appears, disappears, and changes. Relational structures of information is often invisible. This lack of predictability provokes the kind of thinking and conjecture reflected in critical thinking and the literacy/acquisition oriented discourse that accompanies it.

4. **MALLEABILITY**
   Electronic texts are subject to mutilation by learners. As such, their malleability provokes thinking and accompanying discourse that pertains to changing and shaping both form and content.

5. **DEMOCRATIZING**
   When learners, and learners and their teachers work together around e-texts, there is potential for a leveling of authority. Learners who may not otherwise have opportunities to express and enact their beliefs and opinions may do so by virtue of the machine.

6. **ANCHORED REFERENTS**
   E-texts provide immediate concrete referents to which talk can be anchored. This is most frequently manifest in learners and teachers pointing with their fingers or with the cursor (mouse) to something on the screen that illustrates (anchors) their talk and thus both meshes aural and visual, and form-meaning correspondances.

APPENDIX B: OPTIMAL CONDITIONS FOR LANGUAGE LEARNING IN INSTRUCTIONAL CONTEXTS

1. Need and desire to communicate which includes involvement and interest in what is being talked about.

2. Opportunities to control the topic of conversation and self-initiate in class.

3. Negotiation of meaning using language patterns, routines & strategies.

4. Challenge slightly beyond the current level of proficiency.

5. Opportunities to perform a wide range of language functions.

6. Opportunities to engage in planned and unplanned discourse - a balance of form-focused language work and less structured communicative practice aided by scaffolds for students to try out new linguistic structures and functions.

APPENDIX C: SAMPLE INTERSECTIONS OF THE UNIQUE FEATURES OF E-TEXTS AND OPTIMAL CONDITIONS FOR CLASSROOM SECOND LANGUAGE LEARNING

1. Anarchy. When learners can use the software successfully and if they are left to their own devices they can approach and use electronic texts in ways that they deem useful. In this situation a need and desire to communicate emerges that is student driven and which leads to anarchic patterns of interaction with the teacher. The following excerpt shows two ESL fourth graders selecting their favorite wordplay jokes. Up to this point the two children have been finding and sharing with one another several of these jokes; they have recently turned to their teacher to share with her one of their favorites. She approaches, appropriates the mouse, and scrolls through to see what jokes they have read and shared thus far.

S1: (watching the screen as the teacher randomly scrolls and clicks) A star! What does the star mean?

T: I don't know.

S1: (looks at screen) I don't like that one.

T: (reads from screen) Choose a stamp. Oh, I bet you go to . . .

S2: Oh, yeah. Remember when you stamp your favorite?

S1: Yeah.

T: (clicks on an item) Okay. (Takes hand off mouse. NNS1 takes over as T walks away).

S1: Aw, we don't want this one.

S2: She went to . . . (points to screen) go to the next one. Yeah, right there.

There is a special, anarchic quality to the manner in which these two fourth graders negotiate and make their selections that is independent of both teacher-imposed or software-imposed structure. The learners exercise volition, and in doing so, actively make judgements and negotiate selections through peer discourse.

When teachers interacted with students in response to the anarchic feature of e-text, they often attempted to scaffold the decision making process by suggesting helpful strategies for students to consider. In other instances, the teacher was equally unsure about how to proceed. In the ensuing discourse it was clear that the final decision rested with the student:

NS: (Watching the screen as the teacher randomly scrolls and clicks): A star! What does the star mean?

T: I don't know.

S: (Looking at screen): I don't like that one.

T: (Reads from screen): Choose a stamp. Oh, I bet you go to . . .

S: Yeah.

T: (Clicks on an item): Okay. (Takes hand off mouse and student takes it. The Teacher walks back to her desk.)

S: Aw. We don't want this one.

NS: She went to . . . (Points at an item on the screen), Go to the next one. Yeah, right there.

2. Publicness. When students work on computers, their on-screen products are usually highly visible and as a result can be easily critiqued. When a teacher is critiquing she naturally takes control of the topic and can engage in traditional error correction.

T: What's the matter? Are you stuck? (looking at computer screen, notices a grammatical error in a sentence – a singular verb is used where a plural is correct) Let me read that to you. "There is over 25,000 different fish. There is over 25,000 different fish." Do you hear what's wrong with that?

S: Uh-uh.

T: There is over 25,000 . . .

S: Oh! (long pause) No.

T: So you want . . . what word? There can be a singular word. There is. There is one. There is two?

S: Is.

T: Is, is singular, right? What word makes more sense there? We use 'is' when we use singular words. What do we use when we use plural words?

Thus when the teacher chooses to focus on linguistic form, she is supported by the publicness of screen visibility. This allows her to engage the students easily in a dialog about form.

Publicness also enables teachers to initiate scaffolding as well as engaging in direct instruction. In the following example, two NNS students are paired at a computer. One is helping the other to get started with a new software program and the teacher enters the interaction.

T: (Returns to where NNS1 and NNS2 are working), S---s never used this before. What if she can't read all of these words? Will the computer help her K---?

NNS1: Yeah.

T: How?

NNS1: If she just clicks on it, it says the word (points to screen).

T: Give it a try S----. Click on one of those words up there.

NNS2: Hey. (She points and clicks the mouse highlighting the word – bull).

T: Cool. Do you know what a bull is?

NNS2: umm?

T: Would you like to see what a bull looks like?

NNS2: Yeah.

T: All right. Then you type the letters in. Can you tell me what the letters are in bull? (points to the word on screen).

NNS2: B.

The feature of publicness is also supported by the fact that those near the screen have ready access to the mouse when a point needs to be made or a maneuver demonstrated. In the accompanying language interactions, students have many opportunities to engage in unplanned discourse. In our observations, unplanned discourse occurred in talk that was prompted by something unusual or exciting about a student's work being noticed. Talk between students was often focused on the software and was

characterized by the students pointing at the screen or using the mouse tracking arrow to point to an on-screen item:

NNS1: Right there (points to screen). Background.

NNS2: Okay (moves the mouse).

NNS1: Click on it (pointing at screen).

NNS2: What?

NNS1: Background. Right there. Yeah, click it. Hold it. (Points to picture on screen), See, it goes to farm. Back up to there. If you want pictures just push this (points to screen).

NNS2: Okay (controlling mouse and moving it).

NNS1: And push it. Push it. Then it says show list. (Watching as NNS2 moves tracking arrow), Right there. Then you got to type it. That you want . . . like type, just type the word.

3. Instability. Dealing with the unseen and unpredictable side of electronic texts – the virtual, tenuous aspect of representation – pushes children to solve abstract problems of the unseen. In the following instance, two children are working to navigate tools and functionality that are not immediately perceivable, but that at least one of the children is fairly confident exists in an unstable state. The children's negotiations are thoughtful efforts at mastering the unseen, relational side of the texts they are working with. The instability of the medium provides a need for the students to communicate.

S1: Right there. (points to screen) Background.

S2: Okay. (moves the mouse)

S1: Click on it. (points to screen)

S2: What?

S1: Background. Right there. Yeah, click on it. Hold it. (points to screen) See it goes on the farm. Back up to there. If you want pictures, just push this (points to screen)

S2: Okay (controlling the mouse)

S1: And push it. Push it. Then it says show list. (watching as other student moves cursor) Right there. Then you got to type it. That you want. Like, type, just type the word.

The instability of the computer medium also affects topic control. When neither of the interlocutors is sure of what is happening, collaborative discourse emerges in which no one party is in total control.

T: Go up there in the file and see.

S1: So we're going to get it all right cause it's all right here.

T: Could you save it all at once? Maybe that . . .

S2: (clicks on File on the menu bar) Oh here we go. (clicks on items and highlights them and reads) Back - Home - Help.

Students on computers are required to respond to an array of unpredicted and unanticipated demands while operating machine features in the electronic text environment. They find that they are forced to negotiate pop-up dialog boxes, toolbar options, and new screens. The resulting discourse between students and between students and teachers gives rise to much unplanned talk as they encountered unanticipated machine demands

In the following excerpt two NNS students are using a software program to make a banner.

S1: Okay. (Clicks mouse and screen goes black. A menu bar appears at the top of the screen. NNS1 and NNS2 both stare at the screen. Another student working at a nearby computer looks over, shrugs his shoulders and laughs). Where do we go next? (moves mouse randomly).

S2: Over here on the right? It's like its just caught.

S1: Yeah really. (Points to the keyboard), I think we should push this.

S2: Okay.

S1: (Trying a few keys) No.

S2: (Looks at screen) You just have to wait 'cause it's like just taking a while. (Both students sit with hands folded. They both look at the teacher who is next to them working with another student. The teacher walks away, not noticing them. They turn back to the screen).

S1: (Clicks on the menu bar) What are we doing?

Here the talk was characteristic of that between collaborative partners, both jointly invested in successfully completing the instructional activity. The instability of the medium made collaboration with its ensuing unplanned discourse necessary for the students to progress in the activity.

4. Malleability. Electronic texts are subject to mutilation by learners. As such, their malleability provokes thinking and accompanying discourse that pertains to changing and shaping both form and content.

There are multiple instances of this feature contributing a need and desire to communicate on the part of learners and their teachers. The fact that information on the screen can be altered provokes talk centered on changing, creating, editing, combining what is on the screen. This implies rethinking, renegotiating, reshaping, and rejudging in a very public way both form and meaning.

In the following excerpt, a second grade student is building a story by composing text with accompanying pictures and sound.

T: Could you move the dog, J------? Let's see you move that.(student moves the dog with the mouse) Put him over by the barn. Is that the size you'd like your dog to be?

Many computer programs have malleable graphic components with non-linguistic choices for the students to make. This graphic choice also constrains the traditional teacher role of arbiter of knowledge even when she is firmly in control of the topic.

T: What did you do Chang?

S1: I clicked on the dog.

T: And then what did you do to make it move? What did you do with your hand?

S1: I touched the dog and I was moving the mouse. (points to the screen)

T: Could you move the dog Juana? Let's see you move that. (Juana moves the dog with her mouse) Put him over by the barn. Is that the size you'd like your dog to be?

S2: No.

Thus the malleability of the medium and the control over it that the student has, in a sense, counteracts the typical domination of topic that a teacher enjoys.

5. Democratization. When learners and their teachers work together around electronic texts, there is potential for a leveling of authority. Learners who may not otherwise have opportunities to express and enact their beliefs and opinions may do so by virtue of the machine.

Having computers in classrooms can change roles in significant ways. Since the focus of attention is on the screen, the computer mediates the discourse. This can have a democratizing effect in which the teacher no longer has control of the topic and the ensuing discourse is conversational in nature. In this excerpt

S1: Ms. F-----, what happened to the computer here?
T: I don't know. What did you do?
S1: We were playing with that banner thingy.
S2: We were doing one. We didn't print it though.
S3: They went over there.
T: You went over there?

6. Anchored Referents. Electronic texts provide immediate concrete referents to which talk can be anchored. This is most frequently manifest in learners and teachers pointing with their fingers or with the cursor (mouse) to something on the screen that illustrates, or anchors, their talk and thus both meshes aural and visual, and form-meaning correspondences.

In these interactions there is a great deal of what we call "point talk," that is discourse between learners and instructors which involves pointing to concrete referents on the computer screen as a means of illustrating and supporting what is being said and understood. Frequently learners and teacher talk through on-screen movement, change, and the accompanying problem solving and decision making that electronic texts entail.

When students and teachers talk about what they are doing on-screen, reference is anchored to what is visible on the computer monitor and this "here and now" quality of the discourse affects the control the teacher the teacher can exert.

T: Okay. Stop right here. Did you take a picture of this? (points to screen).
S1: Yeah.
T: Top one. Turn it up.
S2: This one, right?
T: Yeah, top one. Stingray. So it pronounces it for you.
S1: In some of them it gots different languages like (moves mouse to an item while pointing to a menu bar with the other hand)
T: (takes the mouse) How did you get another lang . . . Let me look over here and turn the volume up.

Anchored referents provide a focus for discourse and consequently students' unplanned discourse is stimulated and guided by on-screen referents. In interactions between teachers and students, the referents establish a base structure for the teacher's building of instructional scaffolds. Furthermore, anchored referents provide a clarity of purpose when teachers initiate direct instruction. They also serve to focus

students' ensuing planned discourse given in response to that instruction. In the language interactions around anchored referents, talk is characterized by recurrent use of words that locate the talk in the electronic text environment. Words like "this," "that," "here," "there," and "those" are frequently used and accompanied by finger pointing or movement of the tracking arrow around the computer screen.

In this excerpt, a student is writing a story about a farm. The teacher draws her attention to the text:

T: Look up here. (Points to screen). Do you see farm written anywhere? Up here. We called your story farm and you are on page one. (Holds a piece of paper to the screen) Can you find the word farm?

S: Farm., page one. (points to the screen).

T: And that is your story, page one. J---- has a farm. Can you tell what letter you need to type in? (points to screen).

APPENDIX D: INTERVIEW CODING SCHEMA

The following themes emerged from the collected interview data and were subsequently used to code and synthesize stakeholder discussion of these themes.

- E-text features
- BICS/CALP
- Second Language Acquisition (theories)
- Communicative Frameworks
- Affect
- Learning Standards
- Achievement
- Motivation
- Parents

Please help us assess the quality of our research report series by completing and returning the questionnaire below:

NAME OF REPORT: **ELECTRONIC TEXT AND ENGLISH AS A SECOND LANGUAGE ENVIRONMENTS**

1. Your position:

____ elementary school teacher	___ state ed. agency staff	___ policy maker
____ middle school teacher	___ professional developer	___ researcher
____ high school teacher	___ school administrator	___ education writer
____ college teacher/professor	___ district administrator	other_____

2. Clarity

	Very well				Not at all	
a. The concepts in this report were clearly expressed.	1	2	3	4	5	N/A
b. This report was well organized.	1	2	3	4	5	N/A

3. Utility

a. Reading this report gave me new information or insight into teaching or learning.	1	2	3	4	5	N/A
b. This report addresses a current and important problem in education,	1	2	3	4	5	N/A
. . . and offers a solution to the problem.	1	2	3	4	5	N/A
. . . and/or helps the reader understand the problem from a different perspective.	1	2	3	4	5	N/A

1. I found the ideas and solutions offered in this report to be feasible given current realities of policy and practice. 1 2 3 4 5 N/A

4. Scholarship

The conclusions drawn in the report are

. . . adequately supported by the research presented.	1	2	3	4	5	N/A
. . . fully grounded in theory.	1	2	3	4	5	N/A

5. Any other comments or suggestions regarding this report or additional research needs in the area of English and language arts teaching and learning are greatly appreciated.

_____

_____

_____

_____

_____

Please return this form to:

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